

**Connecting Residents to Resources for Energy Efficiency, Water Conservation,  
and Household Level Sustainability in Flint, Michigan**

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March 2015

Masters project submitted in partial fulfillment of the  
requirements for the Master of Environmental Management degree in  
the Nicholas School of the Environment of  
Duke University

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## Connecting Residents to Resources for Energy Efficiency, Water Conservation, and Household Level Sustainability in Flint, Michigan

### Executive Summary

The UM-Flint Urban Alternatives House (UAH) is a LEED Platinum certified residential property redevelopment project established in 2010 through a partnership between the Genesee County Land Bank Authority and the University of Michigan-Flint. UM-Flint with community partners seek to use the UAH as demonstration project that connects residents in Flint and Genesee County to programs and resources that support adoption of sustainability measures to increase community resilience. Population decline and economic challenges are evident in the metropolitan Flint area, and energy costs place a larger financial burden on low income households. The desire to connect residents to resources that reduce residential energy and water costs while advancing adoption of sustainable practices informed development of this study.

The objectives of the study were to identify organizations and programs in Flint and Genesee County that provided resources or support to advance household level energy efficiency, water conservation, and sustainable development practices, to understand how these organizations are networked together, and to understand the opportunities and barriers they perceive relative to advancing efforts in the region. To meet this objective, the study focused on gathering organization level information and perspectives. Participants were identified using a snowball sampling technique.

Stakeholder analysis and social network analysis were the methods used to inform the study. The stakeholder analysis was completed using an integrated approach, informed by semi-structured interviews with nineteen stakeholders (n=19). NVivo 10 quantitative analysis software was employed to analyze stakeholder interview responses using a strategic perspectives approach. An actor linkage survey was completed by seventeen of the participants (n=17), and the information collected from the surveys provided data for the social network analysis completed using NetMiner10 software.

Forty-eight organizations were identified as stakeholders with direct or indirect alignment with the study area. Thirty-four of these organization were active in the study region. Analytical categorizations resulted in organizations being classified in three levels: *type* (i.e. Government, community organization, etc.), *organizational alignment* identified as 1) Community Economic Development, 2) Community Education and Engagement, 3) Health, and 4) Coordination/Collaboration, and *study alignment* identified as 1) Energy Efficiency, 2) Water Conservation, 3) Construction (Regular and “Green”), 4) Agriculture and Food Access, and 5) Recycling and Waste Management.

The first portion of the results section explores the themes found through analysis of the stakeholder interview data. The *organizational alignments* provided a broad context through which the themes emerged. Community economic development examines the role of stakeholders involved in housing programs, often supported by state and federal funding aimed at low to moderate income

households. Community education and engagement highlights the important role of the utility provider as well as water quality and resources management organizations, and educational institutions. Health aligned stakeholders included those that addressed household hazards and organizations engaged in local food system work. Coordination and collaboration identifies that many partnerships exist, but only one local collaboration focused primarily on household health and sustainability. Opportunities and barriers are also examined.

The second portion of the results section features the results of the social network analysis. The social network analysis focuses on measures of centrality, exploring the properties of an actor (stakeholders represented as nodes in the network) and the prominence of said actor in the network based on the ties to other actors. Measures of centrality highlighted in the analysis include in- and out-degree centrality, closeness centrality, and betweenness centrality which are often positively correlated. The dominant actors and the deviations from the positive correlations found between the centrality measures are identified.

The discussion and recommendations section of the study notes that a variety of programs and initiatives exist that support energy efficiency, water conservation, sustainable construction, and overall household level sustainability in the study region, but few stakeholders have a primary focus in these areas. Recommendations for ongoing stakeholder engagement with existing efforts and approaches to advance education and outreach objectives are made. The impacts of fluctuations in funding, particularly at the federal level, areas in which services are being centralized, and market gaps revealed by the study are discussed.

The study identifies several areas to advance residents' connections to energy efficiency, water conservation, and household level sustainability, and concludes with the following:

- Education is both an opportunity and a barrier to connecting residents to resources for energy efficiency, water conservation, and household level sustainability. The inventory of programs may serve as a starting point to connecting residents to these resources, and development of a social marketing campaign could advance both promotion and adoption of these resources.
- Stakeholders in the Flint area are actively partnering on a number of initiatives and to advance community sustainability in a larger context. Building a shared understanding of household sustainability, understanding the strengths and limitations of partner organizations, and finding ways to creatively leverage resources through new and existing collaborations could support efforts moving forward.
- Ongoing engagement with stakeholders aligned with fair housing, natural resource management/water quality, and local food systems is recommended. The important role of government in connecting to resources and advancing a collective vision is recognized. Building alignments with business and economic development efforts is also suggested.

## Acknowledgements

I would like to express my gratitude to all the stakeholders that gave of their time to participate in this study. Without their contributions and insights, the project would not have been possible. I would also like to thank Dr. Randy Kramer, my advisor for this project. Dr. Kramer's time and attention during the development of this project was invaluable. Additionally, I would like to thank my employer, the UM-Flint Department of University Outreach, for their support of this work.

This study was conducted on behalf of the UM-Flint Earth and Resource Science (ERS) Department and the UM-Flint Urban Alternative House. I am grateful to the ERS Department for allowing me to take on this project on their behalf. In particular, I would like to thank Richard Hill-Rowley, the UM-Flint ERS faculty member who championed development of the UAH and who first brought this project to my attention. Partial project funding was provided through the ERS Department via a grant from Consumers Energy in the amount of \$1000.

## **Connecting Residents to Resources for Energy Efficiency, Water Conservation, and Household Level Sustainability in Flint, Michigan**

### **Introduction**

#### **UM-Flint Urban Alternative House (UAH)**

The UM-Flint Urban Alternatives House (UAH) is a LEED Platinum certified residential property redevelopment project in the Central Park neighborhood of Flint. First established in 2010 through a partnership between the Genesee County Land Bank and the University of Michigan-Flint, the renovation of the 1920s home was completed in late 2013. Featuring two residential rental units, a classroom and community space, and raised bed community gardens, the UAH serves as a living and learning laboratory for UM-Flint faculty and students and community partners. The UAH is outfitted with state-of-the-art energy efficiency and sustainable development technology. The features of the UAH provide an opportunity to leverage this asset as a working demonstration project to advance knowledge and understanding of sustainability to support community-level resilience in the face of global climate change.

Key objectives identified during the development phase of the UAH aimed to advance the vision of the UAH as a resource for sustainable community development (Barth et al, 2011). In addition to providing a teaching and learning space for university students, the UAH partners seek to support and expand a broad community discussion on energy efficiency and water conservation at the household level and in residential redevelopment strategies. In alignment with the civic engagement mission of the UM-Flint campus, the UAH partners seek to engage with other local institutions including government, non-profit, and neighborhood level agencies to coordinate efforts to advance implementation of sustainable technologies.

#### **The Local Context**

The vision for the UAH project aligns with larger goals guiding redevelopment efforts within the City of Flint. Flint, Michigan is a good example of a redeveloping post-industrial rust belt city working to forge a new path for a sustainable future. In 2013, the City of Flint completed and adopted the first update to its Comprehensive Master Plan since 1977 (Houseal Lavigne Associates, 2013). The Imagine Flint 2013 Master Plan documented the realities of the city. The population in Flint declined by 43% between 1970 (193,317 residents) and 2000 (102,434 residents) driven largely by losses in the auto manufacturing industry. Continued economic decline, negative job growth, and the recession resulted

in another 18% drop in the city's population from 2000 to 2010 to a total population of 102,434 residents.

The challenges of the population decline and related issues are reflected in the residential and commercial land use patterns in Flint, which feature aging housing stock and large quantities of vacant and abandoned properties (Houseal Lavigne Associates, 2013). Approximately 22% of Flint's residential parcels are vacant lots, and 14.1% of Flint's parcels contain houses in poor or substandard conditions. 82% of Flint's housing stock was built before 1970, and 77% of all units are single-family residential homes. To respond to these challenges, the Imagine Flint Master Plan identifies a number of neighborhood redevelopment strategies that aim to strengthen traditional neighborhoods, establish new green neighborhoods with low density and sustainable development features, and support new mixed use and mixed residential development.

Implementation strategies were identified to advance the Imagine Flint Housing and Neighborhood Plan goals (Houseal Lavigne Associates, 2013). Two specific master plan strategies were identified that align with the UM-Flint UAH vision to advance sustainable community revitalization efforts. The Imagine Flint Housing and Neighborhood Plan Implementation Matrix (Houseal Lavigne Associates, 2013, p.116) identifies the following Sustainability Practices:

- "Coordinating with stakeholders to increase awareness of energy saving and water conservation practices in the home"
- "Encourage the use of best practices in green technology and sustainability in all new construction"

UM-Flint and the UAH partners' seek to advance the vision of the UAH in alignment with and in support of the sustainable development implementation goals identified in the Imagine Flint Master Plan. Efforts to advance household level sustainability must also take into account the needs of area residents.

In 2011, 40.6% of all Flint residents were identified as living below the poverty level (Houseal Lavigne Associates, 2013). Energy costs place greater financial burden on low-income individuals. In fiscal year 2011, despite spending 13.2% less on average household energy expenditures, low income households carried nearly double the mean individual energy burden as compared to the mean for all individuals (U.S. Department of Health and Human Services, 2014). According to the U.S. Bureau of Labor Statistics, despite decreasing natural gas costs, household energy fuel bills alone accounted for an average of 6% of total consumer expenditures in 2012 for households in the lowest 20% of income (before taxes) (EIA, 2013).



Flint's rising residential water and sewer rates create an additional financial strain for residents. Since 2010, City of Flint water and sewer rates have undergone a series of increases. Between September 2011 and July 2012 alone, retail rates increased by 47% (Fonger, 2014). In June 2014, Flint residential water and sewer rates were the highest in Genesee County at a \$140 average per household monthly rate, \$35 higher than any other Genesee County municipality and \$90 higher than the lowest rate (Adams, 2014). Providing opportunities for increased energy efficiency and water conservation can help ease the financial burden of those most at risk in our community.

## Project Objectives

The UAH is an example of best practices in energy efficiency and sustainable redevelopment of a residential property, as evidenced by the LEED (Leadership in Energy & Environmental Design) Platinum rating awarded to the project. UAH partners seek to advance knowledge and understanding of the available resources within the community that support residents in adopting sustainability practices to advance community resiliency. The partners hope to leverage the UAH as a community resource, build off of UM-Flint's commitment to civic engagement, and engage with organizations and institutions in the region with the relevant expertise to achieve that goal.

The objective of this study are to support the UAH partners in achieving that goal by answering the fundamental questions:

1. What organizations and programs in Flint and Genesee County are providing programs or support that advance household level energy efficiency, water conservation, and sustainable development practices?
2. Are these organizations are networked together, and what the opportunities and barriers do they perceive are relative to advancing these efforts in the region?

Limited access to information that is currently only available through diffuse sources was identified as a suspected barrier for individuals making household decisions about energy efficiency, water conservation, and sustainability. Completion of an inventory of programs and a stakeholder analysis that identifies organizations and resources supporting household sustainability and sustainable development provides an opportunity to increase understanding of and access to options, cost-savings, and programs. This inventory will help inform UAH and City of Flint efforts to make resources more readily available for residents in order to support adoption of sustainable practices and technology at the individual level.

The ultimate goal of this project is to develop a foundation that informs ongoing efforts to provide residents in Flint and Genesee County better access to information supportive of household decision-making that decreases energy and water consumption, lowers costs, and advances community sustainability. Engaging stakeholders offering energy and water efficiency programs, building a better understanding of available services, and identifying potential opportunities for collaboration between service providers can assist in informing broader understanding of community needs and opportunities to guide efforts that support household sustainability and residential development moving forward.

## Methods

### Stakeholder Analysis

A stakeholder analysis was utilized to inform this study. The term “stakeholder analysis” refers to a broad range of methodologies and various tools used to understand “stakeholders (individuals, groups, and organizations) who have an interest (stake) and the potential to influence the actions and aims of an organization, project or policy direction” (Brugha & Varvasovszky, pg. 239, 2000). With roots in organizational management and policy process, stakeholder analysis has been widely applied in various disciplines including health, natural resource management, and development for a number of purposes including to help inform policy, evaluation, management, project development and implementation (Brugha & Varvasovszky, 2000, Reed, et. al., 2009).

Reed, et. al. (2009) provides a comprehensive overview of the various stakeholder methodologies that may be applied during the stakeholder analysis process and outlines a six step methodological approach to stakeholder analysis. The approach involves an iterative process wherein the information gathered during the stakeholder analysis (Steps 1-5 in Figure 1) help further define and inform understanding of the context (Steps 1-2) to guide ongoing stakeholder engagement.

**A. Context**

1. Identify focus (e.g. issue, organization or interventions)
2. Identify system boundaries

**B. Application of stakeholder methods**

3. Identify stakeholders and their stake
4. Differentiate between and categorize stakeholders
5. Investigate relationships between stakeholders

**C. Actions**

6. Recommend future activities and stakeholder engagement

Insource: Reed, et. al. (2009)

*Figure 1. Methodological approach to stakeholder analysis*

Understanding the process of stakeholder analysis is important, but equally important is defining the stakeholder and the information one hopes to gather from the stakeholder analysis process. Kivits (2011) defines stakeholder engagement as a strategy for improving relations and for incorporating various opinions in order to improve project implementation and decision-making. In addition to recognizing the various ways in which stakeholders are identified and defined, Kivits (2011) draws extensively from the literature and research on stakeholder analysis to distill the concepts explored and provides three main components by which stakeholders may be classified and categorized: (1) Salience, (2) Frame of reference, and (3) Stakeholder networks.

Stakeholder salience identifies stakeholders by their striking features or interests while recognizing that outspoken interests and underlying interest may not be obvious or outspoken. Kivits (pg. 321, 2011) identifies “cooperation, competition, threat, predictability, and outcomes” as being within the interest of the stakeholder. These interests can be further examined to identify if a stakeholder may be assessed by a level of support (supportive or unsupportive) or as a competitor. Other factors to be assessed when determining stakeholder salience are power and urgency. Power allows for assertion of the stakeholders principles upon a relationships. Power distribution changes with time, can manifest as normative, utilitarian, or coercive, and may have economic, social, political, or legal implications. Urgency is created when an issue is both time sensitive and important to the stakeholder. Given these features, stakeholder saliency is dynamic, and assessments of stakeholder saliency may change quickly or over time.

The frame of reference refers to the stakeholders views as shaped by their unique experiences, background, education and relationships. Frame of reference may belong to individuals or may be shaped by a shared community context. Shared frames of references may exist between multiple individuals or between groups of individuals. These overlapping frames of reference are referred to as policy discourse (Kivits, 2011). Policy discourse is context specific and described as “the way a group of people looks at a topic and how they will consequently behave towards that topic, in addition to how they interact with other persons on that same topic” (Kivits, 2011, p.232). Stakeholder groups within a community may be divided into subgroups, they may have differing interpretations of the same language, and the goals, motives, and objectives as related to the policy discourse may differ by stakeholder. Frame of reference is more static than salience as it can take significantly longer to change, but understanding of stakeholder frame of reference is imperative to effectively engaging stakeholders in any process.

Stakeholder networks recognize the interconnectedness of stakeholder relationships within a social network. Kivits (pg. 323, 2011) defines social networks as “more or less stable patterns of relationships between mutually dependent actors that form themselves around policy problems or clusters of resources and are formed, maintained and changed by interaction.” Understanding the ties between stakeholders help inform understanding of the social context, which in turn informs stakeholder engagement and structuring of meaningful dialogue. Stakeholder analysis methods utilized to identify the stakeholder salience, frame of reference, and networks vary widely.

Kivits (2011) and Reed et.al. (2009) both categorize stakeholder analysis approaches as either analytical categorization or reconstructive categorization. Analytical categorization take a top down approach where the researcher classifies the stakeholders based on their observations, usually in the absence of direct stakeholder involvement in the process. In contrast, a reconstructive categorization of stakeholders allows the stakeholders themselves to identify their alignment to an issue or project based on their own interpretation. Multiple methods may be used to facilitate the reconstructive categorization process, one of which is strategic perspectives analysis. The strategic perspectives analysis gains insight on stakeholder goals, opportunities and constraints through interviews or workshops with participants.

## Social Network Analysis

Network analysis methodology is another approach to categorization and classification of stakeholders, which examines the relationships and linkages between stakeholders and their networks.

Actor-linkage matrices provide a characterization of relationships between stakeholders. Social network analysis is a more in-depth analysis of the stakeholder relationships with allows for interpretation of the structure of the network through measurement of relational ties.

Social network analysis identifies actors as individuals, organizations, or social groups which are linked with each other through relational ties (Wasserman & Faust, 1994). Ties vary widely in range and type and may refer to similarities (location, membership, attributes), social relations (kinship, affective, cognitive, roles), interactions, and flows (information, resources, etc.) (Borgatti, et al, 2009). The most common use of social network analysis is the study of centrality which explores the properties of an actor (identified as a node in the network) and the prominence of said actor as based on the ties to other actors.

### Centrality

Social network analysis allows for examination of an actor's structural location within a network (Hanneman & Riddle, 2005). Centrality provides a measure of this location through examination of the ties or relationships between actors by degree, closeness, and betweenness. Degree centrality examines the number of ties an individual actor may have with other actors within the network. A higher degree of ties suggest that an actor may have access to more resources within the network when more connections are present. Wherein degree centrality examines immediate ties, closeness centrality examines the distance of an actor to all others within the network through indirect ties. Closeness describe through how many intermediary actors an individual actor may need to work through to reach other actors within the network or through how many channels information must flow to reach an actor (Wasserman and Faust, 1994). Betweenness centrality then measures an actor's position as an intermediary between other actors by geodesic path. A measure of betweenness is reached by locating the geodesic paths between all actors and counting the number of times an actor lies within these pathways (Hanneman & Riddle, 2005).

In a directional network, wherein relationships ties are identified by actors through interactions or flows of information, additional levels of centrality may be measured: in-degree centrality and out-degree centrality (Hanneman & Riddle, 2005). In-degree centrality refers to the number of times ties to an actor are identified by others within a network. Out-degree centrality references the number of ties an actor identifies themselves as having with others in the network. Actors with a high in-degree centrality may be categorized as prominent as many actors recognize a direct tie to them. Actors with a high degree out-centrality may be categorized as influential as they seek to establish ties or exchanges with many other actors.

## Study Design

This study approaches stakeholder analysis through an integrated approach that used reconstructive categorization to complete a strategic perspectives analysis. Strategic perspectives analysis allowed for stakeholders to identify their alignment with the study area, opportunities, and barriers through interviews, providing for stakeholder interests to be defined by the stakeholder themselves. An actor linkage survey was developed to identify the relationships between stakeholders within the study focus area. The actor linkage survey was utilized to develop an actor linkage matrix which was explored within a social network analysis framework. The social network analysis examined the presence or absence, strength, density, and centrality of stakeholder ties within the network. The information gathered was assessed using analytical categorization to inform classification of trends in the alignments of the stakeholders.

## Data Collection

Data for this project were collected through semi-structured interviews with organization representatives. An initial review of available resources identified fourteen organizations that offer programs that address energy efficiency, water conservation, and household-level sustainability practices in the greater Flint and Genesee County area. Additional organizations were identified through a snowball method, or chain-referral sampling technique, wherein stakeholders interviewed identified additional organizations to be included in the study. Of the original fourteen organizations identified, twelve participated in interviews, and an additional seven were interviewed after being identified by participating organizations. Two of the organizations identified in the initial assessment had either dissolved or were in the process of dissolving which precluded their participation in the study. In total, nineteen (n=19) interviews were completed during course of this project (Table 1).

The interviews focused on collection of organization level perspectives with detailed information related to program offered by respective organizations. Interviewees also completed an actor linkage survey to identify connections between organizations providing programs and to inform development of a network analysis. Fifteen of the interviews were conducted in-person and four as phone interviews. Interviews were digitally recorded, and extensive notes were taken during the interview process. Most interviews were conducted with one primary representative of an organization, but two included multiple representatives who contributed to the interview.

*Table 1. Participating Organizations in Stakeholder Interviews*

| <b>Organization</b>  | <b>Sector</b>             |
|--|---------------------------|
| City of Flint - Community & Economic Development, Planning   | Government                |
| Communities First  | Nonprofit                 |
| Consumers Energy   | Investor-owned Utility    |
| Ecoworks   | Nonprofit                 |
| Edible Flint   | Nonprofit (Collaborative) |
| Flint LISC (Local Initiatives Support Corporation)           | Nonprofit                 |
| Flint NIPP (Neighborhood Improvement & Preservation Project) | Nonprofit                 |
| Flint River Watershed Coalition                              | Nonprofit                 |
| Flint SOUP   | Community Organization    |
| GCCARD - Genesee County Community Action Resources           | Government                |
| Genesee County Habitat for Humanity                          | Nonprofit                 |
| Genesee County Land Bank                                     | Quasi-governmental        |
| Green and Healthy Homes Initiative                           | Nonprofit (Collaborative) |
| Kings Karate Ka -Harvesting Earth Educational Farm           | Nonprofit                 |
| Kettering University   | Education                 |
| Metro Community Development - Flint Youth Build              | Nonprofit, Education      |
| Mott Community College's Technology Division                 | Education                 |
| Salem Housing  | Nonprofit                 |
| UM-Flint Engineering Department                              | Education                 |

The information gathered through the interviews assisted in development of an inventory of programs in the region. Specific information on the organizations and network connections between stakeholders (i.e. organizations) interviewed was gathered through completion of an actor-linkage survey. Organization leaders were requested to review the results of the inventory and confirm accuracy of content prior to dissemination of the inventory. The complete study material including informed consent forms, interview scripts and questions, and network analysis survey can be found in Appendix A. Institutional Review Board (IRB) approval for was sought from both the Duke University and the University of Michigan-Flint Institutional Review Boards which determined that this study was not human subject research and thus, does not require IRB oversight. However, as the study was registered with both IRB Boards, study participants were asked to provide informed consent through either verbal consent to participate in the study or through completion of the informed consent form found in Appendix A.

The interviews focused on gathering the following information:

1. Mission of organization and interviewees role within it
2. Programs and program objectives coordinated by the organization that support residents or businesses in advancing energy efficiency, water conservation, or sustainable residential/green building development practices including:
  - a. Population and geographic area served
  - b. Program duration and time frame
  - c. Fee structure (if applicable)
  - d. Number of participants served
  - e. Promotion/advertising
  - f. Opportunities and barriers related to future program offerings and/or expansion
3. Organizations' perceptions of the primary barriers and opportunities to advancing energy efficiency, water conservation, or sustainable residential/green building development practices and programs within the City of Flint and surrounding region
4. Interest in collaborations with groups advancing similar goals and the types of partnerships structure that might benefit to the organization
5. Willingness to have information regarding their organization/programs being promoted through partners' websites
6. Other organizations to be included in the study

In addition to contributing to the compilation of an inventory of relevant programs and organizations, the actor-linkage survey was utilized to compile a matrix that determines stakeholders' relationships and ties with other actors working in household sustainability programs as defined by this study which informed the network analysis. A qualitative analysis of the interview notes was conducted using NVivo 10 software to determine trends amongst stakeholder responses. NetMiner4, a network analysis software package developed by Cyram, was utilized to facilitate the social network analysis and process the data collected regarding actors and ties through the actor-linkage survey.

## Results

### Organizations Identified

The identification of organizations in Flint and Genesee County that coordinate programs or provide support to advance household level energy efficiency, water conservation, and sustainable



development practices (herein collectively referred to as “household sustainability”) resulted in forty-eight organizations being named by stakeholders as having a direct or indirect linkage to this work (Table 2). Of these organizations, twenty were nonprofit (NPO) organizations, fifteen were local, regional, state or federal government entities, six were identified as job training programs or pre-, and post-secondary institutions, four were businesses, including one investor-owned utility, and three associations were identified as playing an important role in supporting the work of the other participating organizations. Of the forty-eight identified, thirty-four organizations directly coordinated or partnered with other entities to support some form of household sustainability practice or program in the Flint and Genesee County region. These thirty-four organizations are listed in the inventory of resources (Table 3).

### Inventory of Resources

The inventory of resources was developed based on the stakeholder interviews and other information. For organizations that did not participate in this study, alignments and programs were ascribed based on input from study participants and were further refined based on literature shared, the researcher’s knowledge of the organization, and by program and organization information found on the respective organization’s websites. Organizations were classified first by *type*: 1) Government, 2) Community organizations (included NPOs and associations), 3) Education, 4) Business, and 5) Utility. An analytical categorization approach informed by the interviews and review of the missions and goals of the organizations resulted in a secondary level of classification of *organizational alignment* identified as 1) Community Economic Development, 2) Community Education and Engagement, 3) Health, and 4) Coordination/Collaboration. A discussion of these alignments appears in the Themes section of this document.

The third level of classification, *study alignment*, was identified based on information gathered through the interviews, participants’ completion of the actor-linkage survey, and available program information. The study alignments were identified as 1) Energy Efficiency, 2) Water Conservation, 3) Construction (Regular and “Green”), 4) Agriculture and Food Access, and 5) Recycling and Waste Management. While agriculture and food access and recycling and waste management were not categories identified on the actor-linkage survey, organizations were recognized as either strongly aligning with this category (agriculture and food access) or added when participants identified it as an important category to support households making sustainable choices (waste management and recycling).

Sources and flows of funding were also identified as an important component of organization and program interactions. Therefore, organizations that administered funding programs or served as a conduit for individuals or organizations to access funds by directly issued grants and contracts, or directly or indirectly providing access to various funding sources such as homeowner financing, rebates, or other funding options were identified. Additionally, organizations that had programs that served income-qualified individuals were also identified. Finally, organizations' were classified by *programs and projects* identified as 1) Community Education Programs, 2) Direct Service Providers (home weatherization, home repair, energy audits, etc.), 3) Enabling Resource Provider, 4) Demonstration Projects, and 5) Job Training and Post-Secondary Access.

Two organizations were removed from the inventory and subsequent stakeholder analysis as the organizations were no longer solvent (MidMichigan Solar) or had announced near-term dissolution of the organization (Resource Genesee), but were included in the network analysis. One organization, the Salem Housing Community Development Corporation (CDC), also announced dissolution of the CDC and transition of some of its previous programs to a new entity, the nonprofit Neighborhood Engagement Hub. As many of the programs relevant to this study were anticipated to continue under the new organization, the change was treated as a transition for purposes of this study. Therefore, the Neighborhood Engagement Hub and Salem Housing are treated as a single entity with former connections (as related to the network analysis) and anticipated ongoing programs and functions (as related to the inventory) maintained. Flint Community School District (FCSD) was removed from the inventory even though it was identified repeatedly as a recipient or partner for programs, because the District itself did not play a primary role for promotion or coordinate any programs or services directly.

The state and federal government agencies have and continue to play an important role in advancing household level energy efficiency, water conservation, and sustainable development practices through policy, priorities, resources, and funding. However, they were collectively removed from the inventory as their primary function at the local and regional level is often realized through their connections to city, township, and county level government (i.e. local government) agencies and through grants, contracts, and programs administered through local government, education, and community organizations.

Table 2. All Organizations Identified

| Organization   | Type                      |
|--|---------------------------|
| Court Street Village Nonprofit Housing Corporation           | Nonprofit                 |
| EcoWorks   | Nonprofit                 |
| Edible Flint   | Nonprofit                 |
| Flint Area Reinvestment Office (FARO)                        | Nonprofit                 |
| Flint LISC   | Nonprofit                 |
| Flint Neighborhood Improvement & Preservation Project (NIPP) | Nonprofit                 |
| Flint River Farm   | Nonprofit                 |
| Flint River Watershed Coalition                              | Nonprofit                 |
| Flint SOUP   | Nonprofit                 |
| Flintopia  | Nonprofit                 |
| Genesee County Habitat for Humanity                          | Nonprofit                 |
| Green and Healthy Homes Initiative                           | Nonprofit                 |
| Kings Karate Ka - Harvesting Earth Educational Farm          | Nonprofit                 |
| MCD Flint Youth Build  | Nonprofit                 |
| Metro Community Development (MCD)                            | Nonprofit                 |
| Priority Children  | Nonprofit                 |
| Resource Genesee   | Nonprofit                 |
| Salem Housing CDC  | Nonprofit                 |
| Communities First, Inc.                                      | Nonprofit                 |
| Flint/Genesee Jobs Corps                                     | Federal Government        |
| U.S Department of Housing and Urban Development (US HUD)     | Federal Government        |
| U.S. Department of Labor                                     | Federal Government        |
| U.S. Environmental Protection Agency (US EPA)                | Federal Government        |
| U.S. Natural Resources Conservation Services (US NRCS)       | Federal Government        |
| Michigan Department of Environmental Quality (MDEQ)          | State Government          |
| Michigan Department of Natural Resources (MDNR)              | State Government          |
| Michigan State Housing and Development Authority (MSHDA)     | State Government          |
| City of Flint: Department of Planning and Development        | Local-Regional Government |
| Genesee Conservation District                                | Local-Regional Government |
| Genesee County Chamber of Commerce                           | Local-Regional Government |
| Genesee County Community Action Resource Department (GCCARD) | Local-Regional Government |
| Genesee County Drain Commission                              | Local-Regional Government |
| Genesee County Health Department                             | Local-Regional Government |
| Genesee County Land Bank                                     | Local-Regional Government |
| Genesee County Metropolitan Planning Commission (GCMPC)      | Local-Regional Government |
| Flint Community School District                              | Education                 |
| Genesee Career Institute                                     | Education                 |
| Kettering University   | Education                 |
| Michigan State University Extension (MSU Ext.)               | Education                 |
| Mott Community College's Technology Division                 | Education                 |
| UM-Flint (Engineering & ERS)                                 | Education                 |
| Consumers Energy   | Business                  |
| CLEARResults   | Business                  |
| MidMichigan Solar  | Business                  |
| Republic Waste Services                                      | Business                  |
| Genesee Regional Chamber of Commerce                         | Association               |
| Michigan Economic Developers Association (MEDA)              | Association               |
| Ohio Ecological Food and Farm Association (OEFFA)            | Association               |

Table 3. Inventory of Resources by Organization in Flint & Genesee County Area: Energy Efficiency, Water Conservation & Household Sustainability

| Study Participant | Sector | Organization   | Housing & Community Development | Community Education & Engagement | Health / Food Access | Coordination / Collaboration | Primary Alignment (Programs/Projects) | Energy Efficiency | Water Conservation | Construction (Regular/Sustainable) | Agriculture / Gardening | Recycling / Waste Management | Community Education Programs | Direct Service Provider (Weatherization, Home Repair, Home Energy Audits, etc) | Enabling Resource Provider | Demonstration Projects | Job Training & Post-secondary Education | Income Qualified Assistance | Administer funding programs (homeowner financing, grants, contracts) | Organizations | Residents | Notes  |
|-------------------|--------|--|---------------------------------|----------------------------------|----------------------|------------------------------|---------------------------------------|-------------------|--------------------|------------------------------------|-------------------------|------------------------------|------------------------------|--|----------------------------|------------------------|---|-----------------------------|--|---------------|-----------|--|
| ✓                 | Gov    | City of Flint - Department of Planning and Development       | X                               | X                                |                      | X                            |                                       | X                 | X                  | X                                  | X                       | X                            |                              |  |                            |                        |   |                             |  | X             |           | Flint Master Plan, CDBG/Etc funds contracted out |
|                   | Bus    | CLEARResults   |                                 | X                                |                      |                              |                                       | X                 |                    |                                    |                         |                              |                              | X  |                            |                        |   | X                           |  | X             | X         | Contractor for Consumers Energy                  |
| ✓                 | Org    | Communities First, Inc.                                      | X                               | X                                |                      |                              |                                       | X                 | X                  | X                                  |                         | X                            | X                            |  |                            | X                      |   |                             |  |               |           | GreenLife Forums                                 |
| ✓                 | Util   | Consumers Energy   |                                 | X                                |                      |                              |                                       | X                 |                    | X                                  |                         |                              | X                            | X  |                            |                        |   | X                           |  | X             | X         | Multiple programs                                |
|                   | Org    | Court Street Village Nonprofit Housing Corporation           | X                               | X                                |                      | X                            |                                       | X                 |                    | X                                  |                         |                              | X                            |  |                            | X                      |   |                             |  |               |           | EE Lighting project, landlord resources          |
| ✓                 | Org    | Ecoworks (Southeast Michigan)                                | X                               | X                                |                      | X                            |                                       | X                 | X                  |                                    |                         |                              | X                            | ~  |                            | X                      |   | X                           |  |               |           | Youth Energy Squad, seeking ongoing funding      |
| ✓                 | Org    | Edible Flint   |                                 | X                                | X                    | X                            |                                       |                   | X                  |                                    | X                       |                              | X                            |  | X                          |                        |   |                             |  |               |           | Garden support                                   |
|                   | Org    | Flint Area Reinvestment Office (FARO)                        |                                 |                                  |                      | X                            |                                       |                   |                    |                                    |                         |                              |                              |  |                            |                        |   |                             |  |               |           | GHFI coordinator                                 |
| ✓                 | Org    | Flint Local Initiatives Support Corporation (LISC)           | X                               |                                  |                      | X                            |                                       |                   |                    | X                                  |                         |                              |                              |  |                            |                        |   |                             |  | X             |           | CDC support                                      |
| ✓                 | Org    | Flint Neighborhood Improvement & Preservation Project (NIPP) | X                               | X                                |                      |                              |                                       |                   |                    | X                                  |                         |                              | X                            |  |                            |                        |   | X                           |  |               | X         | Homeowner financing and foreclosure prevention   |
|                   | Org    | Flint River Farm   |                                 | X                                | X                    |                              |                                       |                   | X                  |                                    | X                       |                              |                              |  |                            | X                      |   |                             |  |               |           |  |
| ✓                 | Org    | Flint River Watershed Coalition (FRWC)                       |                                 | X                                |                      | X                            |                                       |                   | X                  |                                    |                         |                              |                              |  |                            |                        |   |                             |  |               |           |  |
| ✓                 | Org    | Flint SOUP   |                                 | X                                |                      |                              |                                       |                   |                    |                                    |                         |                              |                              | ~  |                            |                        |   |                             |  | X             |           | Crowd sourced funding                            |
|                   | Gov    | Flint/Genesee Jobs Corps                                     |                                 |                                  |                      |                              |                                       |                   |                    | X                                  |                         |                              |                              |  |                            |                        | X                                       |                             |  |               |           |  |
|                   | Org    | Flintopia  |                                 | X                                |                      |                              |                                       | X                 | X                  | X                                  | X                       |                              | X                            |  |                            | X                      |   |                             |  |               |           |  |
|                   | Edu    | Genesee Career Institute                                     |                                 |                                  |                      |                              |                                       |                   |                    | X                                  |                         |                              |                              |  |                            |                        | X                                       |                             |  |               |           |  |
|                   | Bus    | Genesee County Chamber of Commerce                           |                                 |                                  |                      | X                            |                                       |                   |                    |                                    |                         |                              |                              |  |                            |                        | X                                       |                             |  | X             |           |  |
| ✓                 | Gov    | Genesee County Community Action Resource Department (GCCARD) | X                               | X                                | X                    |                              |                                       | X                 |                    | X                                  |                         |                              |                              | X  |                            |                        |   | X                           |  |               | X         | Emergency Repair (Flint only), weatherization    |
|                   | Gov    | Genesee County Conservation District                         |                                 | X                                |                      |                              |                                       | X                 | X                  |                                    | X                       |                              | X                            |  |                            |                        |   |                             |  |               |           | Urban wood, ag programs, water ed                |
|                   | Gov    | Genesee County Drain Commission                              |                                 | X                                |                      |                              |                                       |                   | X                  |                                    |                         |                              | X                            |  |                            |                        |   |                             |  |               |           | Phase II-NPS ed                                  |

| Study Participant | Sector | Organization   | Housing & Community Development | Community Education & Engagement | Health / Food Access | Coordination / Collaboration | Primary Alignment (Programs/Projects) | Energy Efficiency | Water Conservation | Construction (Regular/Sustainable) | Agriculture / Gardening | Recycling / Waste Management | Community Education Programs | Direct Service Provider (Weatherization, Home Repair, Home Energy Audits, etc) | Enabling Resource Provider | Demonstration Projects | Job Training & Post-secondary Education | Income Qualified Assistance | Administer funding programs (homeowner financing, grants, contracts) | Organizations | Residents | Notes                                       |
|-------------------|--------|--|---------------------------------|----------------------------------|----------------------|------------------------------|---------------------------------------|-------------------|--------------------|------------------------------------|-------------------------|------------------------------|------------------------------|--|----------------------------|------------------------|---|-----------------------------|--|---------------|-----------|---|
|                   |        |  |                                 |                                  |                      |                              |                                       |                   |                    |                                    |                         |                              |                              |  |                            |                        |   |                             |  |               |           |   |
| ✓ Org             |        | Genesee County Habitat for Humanity                      | X                               |                                  |                      |                              |                                       | X                 | X                  | X                                  |                         |                              |                              | X  |                            |                        |   | X                           |  |               | X         | Home repair (Flint)                         |
|                   | Gov    | Genesee County Health Department                         |                                 |                                  | X                    |                              |                                       |                   |                    |                                    |                         |                              | X                            |  |                            |                        |   | X                           |  |               | X         | Lead poisoning prevention                   |
| ✓ Gov             |        | Genesee County Land Bank                                 | X                               |                                  |                      |                              |                                       | X                 | X                  | X                                  | X                       |                              |                              |  |                            |                        |   | X                           |  |               | X         | Land & building sale & lease                |
| ✓ Gov             |        | Genesee County Metropolitan Planning Commission          | X                               |                                  |                      |                              |                                       | X                 |                    |                                    |                         | X                            |                              |  |                            |                        |   | X                           |  | X             | X         | Home improvement fund                       |
| ✓ Org             |        | Green and Healthy Homes Initiative                       | X                               | X                                | X                    | X                            |                                       | X                 | X                  | X                                  |                         |                              |                              |  |                            |                        |   |                             |  |               |           |   |
| ✓ Edu             |        | Kettering University                                     |                                 | X                                |                      |                              |                                       | X                 | X                  | X                                  |                         |                              |                              |  |                            | X                      | X                                       |                             |  |               |           | Student projects                            |
| ✓ Org             |        | Kings Karate Ka -Harvesting Earth Educational Farm       |                                 | X                                | X                    |                              |                                       |                   | X                  |                                    | X                       |                              | X                            |  |                            | X                      |   |                             |  |               |           | Solar, water demonstration                  |
| ✓ Org             |        | MCD - Flint YouthBuild                                   | X                               | X                                |                      |                              |                                       | X                 |                    | X                                  |                         |                              |                              |  |                            |                        | X                                       |                             |  |               |           | Student projects                            |
|                   | Org    | Metro Community Development Inc. (MCD)                   | X                               | X                                |                      | X                            |                                       |                   |                    | X                                  |                         |                              | X                            |  |                            |                        |   | X                           |  |               | X         | Homeowner financing, foreclosure prevention |
|                   | Edu    | Michigan State University Extension                      |                                 | X                                | X                    |                              |                                       |                   | X                  |                                    | X                       |                              | X                            |  |                            | X                      |   |                             |  |               |           |   |
| ✓ Edu             |        | Mott Community College's Technology Division             |                                 | X                                |                      |                              |                                       | X                 |                    | X                                  |                         |                              | X                            | X  |                            | X                      | X                                       |                             |  |               |           |   |
| ✓ Org             |        | Neighborhood Engagement Hub (Formerly Salem Housing CDC) | X                               | X                                |                      | X                            |                                       |                   |                    | X                                  | X                       |                              | X                            |  | X                          |                        |   |                             |  |               |           | Community tool shed                         |
|                   | Org    | Priority Children  |                                 |                                  |                      | X                            |                                       |                   |                    | X                                  |                         |                              |                              |  |                            |                        |   |                             |  |               |           | GHHI coordinator                            |
|                   | Bus    | Republic Waste Services                                  |                                 |                                  |                      |                              |                                       |                   |                    |                                    |                         | X                            |                              |  |                            |                        |   |                             |  |               |           |   |
| ✓ Edu             |        | UM-Flint (Engineering & ERS Depts)                       |                                 | X                                |                      |                              |                                       | X                 | X                  |                                    |                         |                              |                              |  |                            | X                      | X                                       |                             |  |               |           | Student projects                            |

## Qualitative Analysis: Themes

To better understand the stakeholders and their stake as related to the study area, stakeholders were classified by generalized organization and study area alignment. Identification of the alignment areas assisted in describing the interactions and roles of these organizations as related to the study. It must be noted that these alignments were assigned by the researcher based on information collected through the study to better describe the community context and interactions observed and may not be the primary alignments by which the organizations would identify themselves in a broader context.

Classification of organizations and identification of themes was supported by the use of NVivo 10 qualitative analysis software. Notes from the stakeholder analysis interviews were imported into NVivo, and stakeholder responses to interview questions were coded by content area. NVivo allowed for analysis of word and phrase frequency as well as for quantification of the number of stakeholders commenting on specific content areas. For example, Figure 1 displays the words that were most frequently used in stakeholder responses in the form of a word cloud generated by NVivo. Classification of stakeholders and the themes identified were informed by the prominent content areas and alignments revealed during the quantitative analysis.



Figure 2. Word frequency cloud produced from stakeholder interview responses in NVivo 10

## Organization Alignment with Study Areas and Trends

The organizational alignment was identified in relation to the study as reflected in the interviews and purpose or mission of a given organization. Four primary areas were identified during the course of the interviews and were stated as 1) Community Economic Development, 2) Community Education and Engagement, 3) Health, and 4) Coordination/Collaboration. Organizations were identified in alignment with one or more of these areas in terms of their relation to energy efficiency, water conservation, and sustainable development practices. It must be noted that organizations may serve in these roles as related to other functions of the organizations that were not identified in this study. For example, the Genesee County Metropolitan Planning Commission (GCMPC) serves in a coordinating role in relation to development of regional non-motorized transportation initiatives and economic development planning. However, the GCMPC was not identified as coordinating efforts related to energy efficiency, water conservation, and sustainable development, and as such, was not identified as having a Coordination/Collaboration alignment in the inventory. It is within the organizational alignment that emerging themes of the study were identified.

## Community Economic Development: Housing Programs, Funding & Community Demographics

### Community Economic Development

Community economic development is a core function of two types of agencies, government and community development corporations (CDCs), who were identified as serving in important roles in advancing energy efficiency, water conservation, and sustainable development. Historically, community and economic development referred to two separate concepts (Shaffer, Deller & Marcoullier, 2006). Business growth, jobs, and income were identified as being within the realm of economic development while social action, civic involvement, equality, and institutional organizations were referenced as being within the realm of community development. For the purposes of this study, a contemporary definition of community economic development is utilized that merges the ideas economic development and community development to take a “holistic approach to community problem solving.” (Shaffer, Deller & Marcoullier, 2006, p.62) This holistic definition was reflected in the stated missions and purposes of organizations that articulated various goals including, but not limited to: improving quality of life, strategic planning and partnerships, community involvement, neighborhood stabilization, fair housing, land management, and residential and commercial property development. Therefore, agencies that strongly aligned with housing were placed in this category.

Government agencies with alignment in community economic development included the City of Flint Department of Planning and Development, GCMPC, and the Genesee County Land Bank. The Genesee County Community Action Resource Department (GCCARD) was also identified as having this alignment as well as serving an important role in the alignment areas of Community Education and Engagement and Health due to the multiple programs coordinated through this agency which provide wrap-around services to income-qualified residents. GCCARD programs include senior citizen support, Head Start, homeless outreach, commodities food program, neighborhood services center (multiple efforts), and others that work to break the cycle poverty (Genesee County, 2014). However, the strongest alignment with the study area is through the weatherization program that GCCARD has coordinated for more than thirty years as well as coordinating housing emergency assistance programs on behalf of the City of Flint.

Community development corporations (CDCs) are nonprofit, community-based organization that support various aspects of community development with a focus on fair and affordable housing. Six organizations were identified as CDCs or serving in a role similar were: Communities First, Inc., Court Street Village Nonprofit Housing Corporation, Flint Neighborhood Improvement and Preservation Project (Flint NIPP), Genesee County Habitat for Humanity, Metro Community Development (MCD), and Salem Housing. Local Initiatives Support Corporation's Flint Office (Flint LISC) was also included in the study when the central role of CDCs were revealed as Flint LISC supports capacity building for CDCs in low-income communities.

As a program of MCD, Flint YouthBuild was also identified as having this alignment even though the primary program focus is GED completion and job and skilled trades training with a focus on construction. The Genesee Regional Chamber of Commerce (GRCC) and the Flint Area Reinvestment Office (FARO) are also aligned with community economic development, but their primary alignment for this study is explored in the Collaboration/Coordination section.

### **Housing Programs and Funding**

The majority of programs identified focused on improving energy efficiency and water conservation in the home were programs that provided various forms of housing assistance for low to moderate income residents. Ongoing sources of funding for these efforts include U.S Department of Housing and Urban Development (HUD) programs such as HOME program funding (housing development), Community Development Block Grants (CDBG), and Emergency Solutions Grants (ESG). Both the City of Flint and the GCMPC received funding from these sources to support a range of community development activities. Among those activities includes contracting with entities such as the



CDCs identified to offer housing rehab and repair programs to residents in Flint and out-county respectively.

The City of Flint, GCMPC, and the Genesee County Land Bank all were recipients of Neighborhood Stabilization Program (NSP) funding. The Neighborhood Stabilization Program (NSP) was also funded through HUD and played a role in advancing rehabilitation of properties and new home builds that featured energy efficient construction and appliances. Three phases of the NSP program were funded between 2008-2010: the Housing and Economic Act of 2008 established the program, the American Recovery and Reinvestment Act of 2009 funded a second round of the program (NSP2), and the Dodd-Frank Wall Street Reform and Recovery Act of 2010 funded the final round of (NSP3) of the program. Now, most of the NSP programs were at or near completion and no additional funding was anticipated through NSP.

In contrast, the GCCARD Weatherization program is funded primarily through U.S. Department of Energy (DOE) Weatherization Assistance program with additional funding provided through the U.S. Department of Health and Human Services Low Income Home Energy Assistance Program (LIHEAP), Michigan Public Service Commission Program (MPSC). The American Recovery and Reinvestment Act (ARRA) of 2009 had a huge impact on the GCCARD Weatherization program. Prior to 2009, GCCARD was able to address between 130 to 200 housing units per year through the Weatherization program. Through ARRA, GCCARD received \$4 million over a three year period (2009 – 2012) which allowed the organization to service an estimated 1700 homes peaking at 750 homes serviced in a single year. Following the closeout of ARRA and given the current funding climate in the U.S. Congress, federal funding for this work have dropped considerably post-2012. GCCARD indicated that from July 2014 to June 2015, funds were available to address fifty-six homes across Genesee County. The dramatic drop in number of housing units served reflects lower funding levels as well as increasing per unit costs.

CDCs such as Flint NIPP and Metro Community Development serve as access points for residents applying for various forms of home financing and foreclosure prevention services. Through grant funded federal programs such as the Neighborhood Impact Program (NIP), individuals may apply for up to \$7,500 for home repairs that could include repair/replacement of heating, ventilation, AC, water heaters, well/septic systems, energy conservation, and other improvements. While energy conservation may be addressed utilizing these funds, how the funds are used is at the discretion of the individual applying. Applicants for these funds must also meet income guidelines and be credit qualified, which precludes many from being eligible or granted assistance through these programs.

The GCMPC coordinates the Genesee County Home Improvement Program (HIP) for Genesee County residents outside of the City of Flint. HIP offers Deferred Payment Loans (DPL) for home repairs

and improvements including energy efficiency upgrades repayment required at time of property sale, refinancing, and change in designation with repayments based on income (25% repayment-Extremely Low Income, 50% repayment-Very Low Income, 75% repayment-Low Income, 100% repayment-Moderate Income). In 2008, HUD programs began encouraging higher energy efficiency standards for housing repair and rehab programs through these funds which increased resident access to energy efficient and water savings options in the home. However, HIP funds tend to be directed toward improvements to those facing hardship under Section 8 guidelines, which may or may not address energy efficiency specifically.

### Community Demographics

It is not surprising that the majority of programs identified aligned with income qualified assistance programs given the demographics of the region. In 2011, 40.6% of all City of Flint residents were identified as people below poverty level (Houseal Lavigne Associates, 2013). In Genesee County, 30% of households were identified as being at or below 80% of the area medium income (GCMPC, 2015). Additionally, 43% of Genesee County households were identified as being ALICE (Asset Limited, Income Constrained, Employed). ALICE is a measure based on households' available income and assistance received which, based on economic conditions in the geographic areas, assesses a family's ability to afford basic necessities related to housing, child care, health care, transportation and food (Hoopes Halpin, et al., 2014). However, since the programs identified focused primarily on low and moderate income households, 70% of Genesee County and 60% of City of Flint residents are not served by these programs.

### Community Education and Engagement: Utilities, Community Outreach, and Educational Institutions

Organizations were identified as having an alignment with community education and engagement based on the presence of one of two factors. If the organization coordinated programs, projects, trainings, events, or delivered educational materials or messages in alignment with the study focus on household sustainability with community members as their primary audience, they were identified in this category. Alternately, organizations who were involved with programs, projects, events, or educational offerings in the study area and whose primary alignment was as an educational institution were also identified in the category. In total, fourteen community organizations, four units of government, four institutions of higher education, and the primary utility provider for the region,

Consumers Energy and CLEAResults, a business contracted to administer some of Consumers Energy residential programs.

### The Role of the Utility Provider

Consumer Energy, an investor-owned utility, is the primary provider of electrical and natural gas utility service in the Genesee County area. The utilities role in community education and engagement and advancing energy efficiency and sustainability is considerable and codified by law in Michigan Act No. 295 filed under Public Acts of 2008 which was approved by Governor Granholm of October 6, 2008. Public Act 295 of 2008 (P.A. 295), approved through the 94<sup>th</sup> State of Michigan Legislature, is known as the Clean, Renewable, and Efficient Energy Act. The act established a Renewable Energy Standard for Michigan and created Michigan's Energy Optimization (EO) standard. P.A. 295 is stated as follows:

“AN ACT to require certain providers of electric service to establish renewable energy programs; to require certain providers of electric or natural gas service to establish energy optimization programs; to authorize the use of certain energy systems to meet the requirements of those programs; to provide for the approval of energy optimization service companies; to provide for certain charges on electric and natural gas bills; to promote energy conservation by state agencies and the public; to create a wind energy resource zone board and provide for its powers and duties; to authorize the creation and implementation of wind energy resource zones; to provide for expedited transmission line siting certificates; to provide for a net metering program and the responsibilities of certain providers of electric service and customers with respect to net metering; to provide for fees; to prescribe the powers and duties of certain state agencies and officials; to require the promulgation of rules and the issuance of orders; and to provide for civil sanctions, remedies, and penalties. “ (Clean, Renewable, and Efficient Energy Act P.A. 295. State of Michigan. 94<sup>th</sup> Legislature. (2008) [http://www.michigan.gov/documents/mpsc/2007-SNB-0213\\_254495\\_7.pdf](http://www.michigan.gov/documents/mpsc/2007-SNB-0213_254495_7.pdf))

Michigan's EO standard requires all utility providers (electric and natural gas) operating in Michigan to implement programs aimed at reducing energy use with specified targets in order to reduce anticipated future costs to customers. The last bi-yearly report on EO progress was released in November 2014 and detailed outcomes of efforts through 2013 (MPSC, 2014). The report noted that utilities had exceeded EO targets by 132 percent for electric energy savings (totaling 1.3 MWh) and 121 percent for natural gas energy savings (totaling 4.41 Mcf). Customers are expected to realize a more than 3:1 cost of service benefit due to avoided operational and capital costs related to utility generation

as well as indirect environmental and health benefits. With a high net present value, EO programs are expected to yield \$3.75 in savings for every dollar spent in EO programs in 2013.

The EO programs related to energy efficiency, sustainable construction, and renewable energy coordinated by Consumers Energy and provided to utility customers are vast and are directed to all consumer categories. Included in the residential programs are incentive based rebates, educational components, income-qualified offerings, and access to home energy audits (Consumers Energy, 2015). In addition to residential programs, Consumers Energy coordinates with builders on New Home Construction programs, offers a range of programs for commercial and industrial customers, and coordinates and regulates renewable energy programs such as net metering and the Experimental Advanced Renewable Program (EARP) for solar energy (Consumers Energy, 2014). Programs are subject to change over time, and programs focused on residential customers are outlined in **Appendix B**.

In addition to the programs coordinated directly by the utility and organizations the utility contracts with such as CLEARResults, the utility supports grant-making to nonprofits through the Consumers Energy Foundation in the focus areas of social welfare, community and civic development, education, Michigan growth and environmental enhancement, and arts and culture.

### **Community Outreach: Energy Efficiency & Home Energy Audits**

Home energy audits (HEA) serve as an entry point for many of the programs focused on improving household energy efficiency. HEAs are a component of GCCARD's weatherization program, Consumers Energy Home Energy Analysis and Home Performance Rebates programs as well as the utility's income qualified Helping Neighbors program, and the pilot Flint Youth Energy Squad coordinated in summer 2014 by Ecoworks and Flint SOUP. HEAs components vary by program and depth and often occur at two different levels: tier one and tier two.

A tier one assessment consists of a walkthrough home assessment (est. 1 hour) and low-cost installation measures addressed include air sealing, band joist installation, furnace operation/maintenance tune-up, faucet aerators, high efficiency shower head, hot water pipe wrap, programmable thermostat, and compact fluorescent light (CFL) bulb installation. Tier one assessments can also a resident education component and review of home energy bills to identify potential issues and to increase knowledge related to reducing home energy costs. Tier one assessments can also determine if a home has any structural or remediation issues that might preclude it from being eligible for a more comprehensive assessment.

Tier two assessments are more comprehensive and may include elements such as a blower door air leakage assessments and infrared camera assessments to identify areas of air and heat loss, and

carbon monoxide and gas emissions tests of gas appliances including water heaters, furnaces, stoves, and gas appliances, and a consultation. The culmination of a tier two is a comprehensive report to prioritize both high- and low-cost energy efficiency projects for the home. Tier two assessments can include the low-cost installations that were identified as part of a tier one assessment, but may also serve as the first step approving installation (for income-qualified residents) or rebates (for all utility customers) of more costly home energy efficiency upgrades such as windows, appliances, furnaces, or installation.

HEAs are an important component for community education focused on improving energy efficiency in the home. Metro Community Housing's Flint YouthBuild program coordinated with GCCARD to work on HEAs during the height of the ARRA funding. In 2012, Inspired Green, a former contractor for Consumers Energy, conducted an estimated four thousand HEAs in the Flint area. Most recently in 2014, Ecoworks contracted with a local agency, Flint SOUP, to pilot its Youth Energy Squad (YES) model in Flint. Through the pilot, Ecoworks hired nine youth from Flint Community School's Northwestern High School and three crew leaders to conduct Tier 1 home energy audits on 300 homes in the northern Flint community. Their efforts were estimated to save Flint residents \$98,000 in energy savings. The Flint YES pilot also worked with Salem Housing to serve as a base of operations and local agencies to conduct community outreach while incorporating job and life skills training for the youth hired in the program. The Flint YES pilot was made possible by funding provided through Consumers Energy administered through CLEAResults. Despite a successful pilot, the Flint YES program remains on hold until additional funding and a local partner to support ongoing efforts can be secured.

Currently, HEAs are available to all Consumers Energy residential customers for free (income qualified only) or low cost (all other residential customers) at the customer's request. Consumers Energy does coordinate outreach efforts to increase participation in these programs in select markets, as was the case with the Inspired Green efforts offered the Flint area in 2012. Consumers Energy has no plans to target outreach efforts in the Flint area in the near future, but if the opportunity arose, past programs coordinated both by utility and other entities can serve an important role in informing efforts. In communities where Consumers Energy is actively promoting the Helping Neighbors program, the utility noted that encouraging participation can be difficult. Partnerships with local agencies and churches helps, but residents may not realize the value of the program to themselves or may not perceive the utility as being a trustworthy source (i.e. utility as bill collectors). Past HEA coordinators in the study region noted that working with local agencies and community residents as ambassadors for energy efficiency outreach is effective in engaging residents in the program. However, with the utility

serving as the primary conduit for current education and HEA programs for energy efficiency, the benefits of community-based outreach is largely unrealized.

### Community Outreach: Sustainability

Multiple organizations coordinate and support community-based outreach efforts as related to their organizations mission. Most of these efforts do not have an ongoing focus on overall household sustainability with the exception of one: Community First, Inc. Green Life Forums. The Green Life community education and business forums focus on raising awareness for environment and sustainability. Community events introduce Flint area residents to recycling, energy efficiency, pollution reduction, water conservation, and environmentally friendly cleaning products. Additionally, Community First, Inc. supports the Get Caught Green Handed #cfigreenlife social media campaign to promote environmentally friendly and sustainable practices and Green Life Challenge which connects residents to organizations to encourage participation in sustainable behaviors.

Communities First, Inc. is also Sustainable Performance Institute (SPI) HUD Green Credited organization which provides connection to national experience and expertise in sustainable construction, and the CDC is one of the first to advance sustainable construction in multi-family housing (ex. Oak Street Senior Apartments) in the Flint area. The Green Life forums were first launched for Flint residents in 2014 and are currently expanding to forums for businesses as well. The CDC has a desire to expand the program county-wide and increase community outreach and engagement efforts in this area, but organizational capacity was identified as a barrier to this as additional staff and funding support would be required to realize this vision.

Ecoworks (formerly the WARM Training Center) is based out of Detroit and works across Southeast Michigan to create opportunities to learn and practice the sustainable use of energy and natural resources through innovative education, job training, consulting, social business, and advocacy (Ecoworks, n.d.). Programs of Ecoworks in the Detroit area include Detroit Youth Energy Squad (D-YES), green neighborhoods, Reclaim Detroit-property deconstruction and reclaimed products store, water services for property managers, green consulting for business and municipalities, education and outreach, demonstration projects. The primary alignment with Ecoworks in the Flint area was through the pilot Youth Energy Squad model and supporting resident education programs. However, ongoing programming dependent upon securing funding and partners for 2015. Ecoworks is actively seeking local organizations in the Flint area to partner with to continue the Flint-YES program. Potential for multiple areas of alignment in Flint exist if the appropriate partner and funding to support integration and information sharing can be identified.

### Community Outreach: Water Conservation

Also aligning in the area of Community Engagement and Outreach are organizations that have a study area alignment related to water conservation. The Flint River Watershed Coalition, the Genesee Conservation District, and the Genesee County Drain Commission are three organizations that were identified in this area.

The Flint River Watershed Coalition (FRWC) has a stated mission of “partnering to protect, preserve, and improve the Flint River Watershed” (FRWC, <http://flintriver.org/blog/about/>). The FRWC coordinates a number of education, engagement, and advocacy programs related to improving water quality in the Flint River watershed which spans communities across Genesee, Lapeer, Shiawassee, and northern Oakland counties. In addition to the numerous programs and activities related to the FRWC, the organization also partners with the Genesee County Drain Commission (GCDC) around public educational activities that support the National Pollution Discharge Elimination System (NPDES) Phase II program.

Required by the Federal Clean Water Act, the NPDES Phase II program requires municipalities with populations less than 100,000 to manage stormwater management permits that address surface water quality (GCDC, n.d.). In addition to providing residents with information of reporting illicit discharges and improper use of storm drains (point source pollution), NPDES provides a framework for educating residents about non-point sources (NPS) pollution, its sources, and how residents can reduce NPS pollution impacts. The GCDC NPDES Phase II program also coordinates around monitoring, mapping, and new construction standards including development of a stormwater ordinance template and Low Impact Design Manual to support water quality in the region (GCDC, 2014).

The Genesee Conservation District (GCD) is one of seventy-eight conservation districts in the state which serve as special units of the government to actively engage with community to support land and natural resource management. The GCD coordinates an annual tree sale, provides technical assistance to the agricultural community and other groups, and supports community education, particularly in the area of water conservation. Additionally, the GCD partners with Genesee County Habitat for Humanity and the City of Flint on the Urban Wood project. The Urban Wood project reclaims dead street trees which are then milled and sold as lumber at Habitat for Humanity’s ReStore. In the past, the GCD has also provided composters and rain barrels for sale to residents, but has discontinued the program due to low interest.

## Educational Institutions

Post-secondary education institutions have a strong presence in Flint and Genesee County. Three of these institutions were included in the study because each demonstrated alignment with the study area: Kettering University, Mott Community College, and the University of Michigan-Flint. All three were supportive of community building and advancing residential sustainability. Both Kettering and UM-Flint both have civic engagement components that align with course and degree requirements while Mott Community College aligns with the study area through job training with its Green Building program.

UM-Flint offers undergraduate degrees in Environmental Science and Planning and Energy and Sustainable Systems through the Earth and Resource Science (ERS) Department while Engineering offers courses in energy systems and renewable energy through the Engineering (ENG) Department. Other courses relative explore regional and global energy policy and economics through Economics and Political Science Departments. UM-Flint also is the coordinator for the Urban Alternatives House and seeks to leverage that resource for education and community engagement activities. Currently, UM-Flint's primary alignment with the study area is realized through courses that feature a civic engagement component. In courses that incorporate civic engagement components, students are given the opportunity address their course work through integration with real-world scenarios, often working with community partners on a local issue. Civic engagement occurs across the disciplines in a number of different ways, but one example specific to the study area is Mechanical Engineering students in a Renewable Energy course in 2012 working to monitor the solar system that powered the City of Flint's community Christmas tree. Support for organizations wishing to connect with faculty and courses is provided through the UM-Flint Department of University Outreach.

Kettering University offers an undergraduate Alternative Energy Specialty through the Department of Mechanical Engineering. Environmentally Conscious Design is offered through the Industrial and Manufacturing Engineering program, and Graduate offerings include a Green Business Certificate and a Master of Science in Engineering in Sustainable Energy and Hybrid Technology. The Kettering Center for Fuel Cell Systems and Powertrain Integration has research focus on renewable fuels, energy, and fuel cell technologies. Kettering's primary alignment with community projects in the study area is through completion of an undergraduate thesis which is a requirement of graduation for all undergrads. Many Kettering students meet this requirement in conjunction with a traditional co-op experience at a company, but for those that do not, Kettering's Center for Culminating Undergraduate Experiences also supports students in completing their thesis in the areas of Research, E-ship



(Entrepreneurship), and Professional Practice. It is through Professional Practice that students address community-based projects that may align with energy efficiency, water conservation, or sustainable practices. Examples of community-based projects taken on by student teams in the past include development of Harvesting Earth Farm's solar demonstration project and cistern and water catchment system and development of aquaponics systems in partnership with Metro Community Development and their YouthBuild program. Large projects such as these may be addressed by multiple teams of students addressing various components of a project over time.

Mott Community College offers a Sustainable Construction Certificate program. Courses in the Certificate program feature a variety of courses which include construction, green construction, weatherization, energy auditing, and renewable energy technology. Given the program structure and other limitations, students in the Sustainable Construction Program rarely take on community-based projects in the classroom. However, students are encouraged to volunteer with community groups to expand their skill sets, and MCC students serve as an important resource for organizations looking for skilled workers in the green building trades.

With all education organizations interviewed one theme was paramount: while they are interested and willing to participate in community projects or programs within the confines of their respective programs, that alignment must occur within the framework of meeting the educational goals and objectives of their educational programs and the needs of their students. Project development aligned with the study area requires a full assessment of timing and capacity of the respective educational institutions program, the participating class and/or students, and a commitment from a community partner that can supply time and resources to realize a mutually-beneficial partnership. While the educational institutions serve as a source of expertise, the primary role of faculty and students is not as consultants or to compete with local service providers. Instead, the educational institutions interviewed seek to support community building, advancing sustainability efforts, and fostering innovation in meeting community needs through community partnerships that support learning goals.

## Health: Healthy Homes, Food Access & Water Conservation

### The Problems with Older Homes

The older housing stock in the Flint area brings with it a host of problems which can affect the cost and ability of programs to address needs. Older homes often have electrical problems and outdated wiring which can make installing energy efficient equipment cost-prohibitive or impossible. Improving indoor air quality may require the installation of fans and special switches. If the home

requires asbestos abatement, guidelines on federally funded programs require that it not be disturbed. Older homes also have issues with lead paint. It is through the Genesee County Health Department's (GCHD) Childhood Lead Poisoning Prevention Program where alignment with household sustainability is realized. In recent years, collaboration between the GCHD and the GCCARD program have helped to stretch federal funds further to address housing rehab and emergency assistance. However, differences in federal guidelines and funding match accounting can create difficulties. Older homes that require rehabilitation and/or hazard remediation makes realization of healthy and energy efficient home goals very costly.

### The Role of Gardens, Agriculture and the Food Access Movement

The urban gardening movement has a strong presence in the greater Flint area. Over three-hundred community gardens coordinated by neighborhood groups, block clubs, churches, schools, nonprofits, organizations, and others were cultivated in 2014 (Lujan-Haynes, 2014). Gardening and local food networks play a central role in community health by improving access to healthy food and addressing social inequity (Dixon, et al, 2007, Sadler, et al., 2014). For this reason, organizations most strongly aligned with the urban gardening movement were identified as having an organizational alignment with Health.

While local food systems and community-supported agriculture are recognized as serving an important role in community sustainability and economic growth (Feenstra, 1997, Agyeman & Evans, 2003), the primary alignment between the local food network and study area focus on household level sustainability is with water conservation opportunities, particularly at the site level. Stakeholders aligned with both agriculture/food access and water conservation serve in a coordinating role in community education by offering training and support for residents to learn about and implement water conservation. This alignment is realized because water is a key element in the success of gardening and agriculture efforts and manifests through training and demonstration projects that support on-site water reclamation systems such as rain barrels and cisterns and through programs related to composting and soil amendment.

The local food network in the Flint area is comprised of multiple public and private partners (Sadler, et al., 2014), but a few organizations stood out in this area as related to community education. Of particular note is Edible Flint, a collaborative established in 2009 with the stated mission “to support Flint residents in growing and accessing healthy food in order to reconnect them with the land and each other.” (Edible Flint, n.d.) While Michigan State Extension (MSU Ext.) provides staff and coordination for the collaborative, multiple individuals and organizations are represented and contribute to Edible Flint,

working to advance and strengthen the local food network in Flint and Genesee County. Edible Flint provides resources through the annual Garden Starters program which offers low-cost seeds and transplants to establish food gardens for all county residents, direct services such as compost delivery and tilling for gardens within the City of Flint, access to services such as soil testing through MSU Ext. and others, and supports community education initiatives. The largest outreach activity coordinated by Edible Flint is the Garden Tour which introduces over three hundred participants annually to community gardens across the region.

Another organization identified as being alignment with food access and agriculture and water conservation were King's Karate Ka's Harvesting Earth Educational Farm. Harvesting Earth Educational Farm features a one and a half acre urban farm and 2.7 acre fruit orchard located just north of the City of Flint in the Beecher community. It was the first urban farm in Genesee County to be certified organic in 2012 (Schuch, 2012), and the first urban farm earn the Michigan Family Farm's Small Farm of the Year award in 2011 (Schuch, 2011). Harvesting Earth's philosophy links farming and living skills with martial arts to teach defense of self, community, and environment. Multiple educational and volunteer programs are offered by Harvesting Earth including community education, school field trips, and summer camp programs which are supported through grants, fundraising, and sale of produce at the local farmers' market. Harvesting Earth seeks to model sustainable practices that can be replicated at the individual and community level, and has taught and hosted programs related rain barrels, bee keeping, composting, and other sustainable practices. The farm also partnered with Kettering University to design and install a ground water well, rain water/snow melt collection cistern system, and install forty solar panels on the site which was funded through two Ford Foundation grants totaling \$100,000. While Harvesting Earth serves as a great demonstration project of sustainable technologies, it also highlights some of the challenges in technology adoption. Harvesting Earth is still navigating an agreement with Consumers Energy regarding their 2011 solar installation. The renewable energy system proposed in their initial approved application featured both solar and geothermal technologies; however, the geothermal installation proved to be inefficient for heating hoop houses and was discontinued. Now, a new agreement must be negotiated between the utility and the farm, and until that is finalized, the farm is not realizing the cost savings from the solar energy produced.

The many members of the local food network can serve as an important stakeholders in advancing the community sustainability conversation. Flint River Farm, another urban farm operating on a community supported agriculture (CSA) model, was also noted as a resource with their trainings and community composting project. Yet, the strongest overall alignment is with water conservation. Edible Flint representatives note that costs associated with water is a concern for the collaborative and

local gardens. More recent concerns related to the safety of City of Flint tap water have also opened the door for a broader conversation on water conservation which was a theme identified by many stakeholders. While water conservation is not the primary focus of those working in urban agriculture and food access, the natural alignment between water resources and this regional movement offers an opportunity for advancing the efforts focused on water conservation at the individual, site, and community level in the future.

## Coordination and Collaboration

Throughout the course of the interviews it became apparent that collaboration between organizations is occurring, though not necessarily with household sustainability as the focus.. Collaboration within the framework of the study area was most often seen through one-off programs or projects which dissolved at the completion of the program or project, with one notable exception: the Flint Green and Healthy Homes Initiative which is a part of the national Green and Healthy Homes network.

An outgrowth of the nonprofit Coalition to End Childhood Lead Poisoning established in 1986, the Green and Healthy Homes Initiative is based in Maryland and supports “efficient delivery of investment and services for improved outcomes.” (GHHI Website: What is GHHI? 2015) The White House Office of Recovery and the Council of Foundations charged GHHI with leading integration of weatherization, energy efficiency, healthy homes, and lead hazard in 2008. GHHI advances this work by breaking down siloes in the delivery of these services, advancing coordinated efforts, and creatively leveraging funding sources.

GHHI identifies green and healthy homes as those that are clean, dry, safe, contaminant-free, pest-free, well-ventilated, well-maintained and energy efficient (GHHI, 2015). Key elements advocated by the national GHHI include coordination of multiple interventions on a home simultaneously to reduce time, labor and material expenses, single stream application systems for residents to increase efficiency and lower burden on residents to access these resources, and triaging of applications to support resident safety and equity.

GHHI asserts that integration of housing interventions can result in savings of 20-25% over separate delivery of services. Additionally, the GHHI asserts that this approach supports workforce development by offering training for housing intervention and assessment and realizes additional community benefits and savings through energy efficiency measures and improved health and safety.

Flint is one of seventeen GHHI sites across the country. Multiple funding sources have supported this effort since 2011, including support for coordination from the C.S. Mott Foundation

(2011-2014) and support through technical assistance from the National Green and Healthy Homes Initiative (GHHI). The Flint GHHI collaboration is hosted through Priority Children in partnership with the Flint Area Reinvestment Organization (FARO) with a purpose stated as follows:

“The Flint GHHI has established forty collaborative partnerships that will coordinate and facilitate efforts to rehabilitate and renovate unsafe energy consuming homes into safe, healthy, energy efficient homes for low income families. G.H.H.I. will reduce childhood absenteeism due to asthma and other home borne illnesses, increase work attendance of parents, reduce home consumption, and provide job training opportunities for Flint residents.” (Priority Children, n.d, p. 1)

Flint GHHI has experienced some success in coordinating joint initiatives between the Genesee County’s lead abatement program and GCCARD’s weatherization and emergency assistance program as well as coordinating joint applications for funding to install carbon monoxide detectors in homes that receive weatherization assistance, and working with the Community Foundation of Greater Flint to secure matching funds for home rehabs through the Raise the Roof campaign that leveraged funding from the Consumer Energy Foundation. Flint GHHI also initiated an Efforts to Outcomes (ETO) system which provides comprehensive home tracking information; it includes data from GCCARD home rehabilitation and weatherization efforts and Genesee County Health Department home remediation activities such as lead abatement.

Barriers to realizing the full potential of the Flint GHHI program include the lack of ongoing base-funding support to provide coordination of the collaborative effort and difficulties in securing funding for the types of program components required to advance this effort. In addition to funding barriers, the main focus of the Flint GHHI has been health and housing, and the organization has not explored a more holistic approach to sustainability at the residential level. While the Flint GHHI model provides the opportunity to greatly impact advancements in energy efficiency, water conservation, and sustainable development practices, additional staff, resources, and adoption of a more holistic approach to residential sustainability may be required in order to realize the full potential of the collaboration.

## Opportunities and Barriers

Themes emerged relative to the opportunities and barriers to advancing household level energy efficiency, water conservation, and sustainable development practices. The main themes related to barriers were three fold: funding capacity, organizational capacity, and leadership. Barriers related to working in low-income communities were also identified. However, opportunities also emerged to

advance this work which included meeting local need, creative leveraging of available funding, and identification of multiple avenues for advancing a vision for a sustainable community in support of long-term goals.

## Barriers

Almost all participating stakeholders noted that funding was a primary limitation to efforts to advance household sustainability. Especially apparent was the dominant role of federal funding that supported efforts from 2008-2013, which has experienced enormous cuts in recent years. Many organizations, including those not primarily aimed at income-qualified participants, seek to offer services at low to no-cost to reduce barriers to resident participation in response to demographic considerations of the broader Flint and Genesee County community. For many of the nonprofits and CDCs, the business model is dependent on grant funding from both public and private sources to maintain even basic operations in addition to specific programs. Programs focused on household level energy efficiency upgrades and sustainable construction can bring with them large price-tags, particularly where remediation of issues inherent to hazards in older housing stock (i.e. lead, asbestos, poor wiring or plumbing, etc.) was needed.

Organizational capacity presented another issue. Organizational capacity refers to the limitations of the organization, its knowledge base, and staff capacity to address the needs identified. All of the stakeholders interviewed were supportive of advancing household level sustainability, but many were limited in their ability to do so as these efforts were often ancillary to their organization's primary mission. None of the organizations identified had staff dedicated solely to advancing household sustainability with the exception of the GCCARD Weatherization program which is narrowly focused on income-qualified participants. Fluctuations in funding also inhibited organizational capacity. While some organizations like GCCARD were able to scale up operations when funding was available, not all organizations are able to navigate the expansion and subsequent contraction of efforts as funding streams disappear. The growth and shrinkage of staffing levels creates instability and uncertainty in many organizations.

Leadership and common vision was another identified barrier. Linked to organizational capacity, leadership speaks to an organization's dedication to a broader focus on sustainability. The study revealed that the knowledge-base and perceptions around sustainability and the costs and benefits of energy efficiency, water conservation, and green building varied widely across stakeholders. While stakeholders were generally supportive, a common understanding of what household level sustainability could or should encompass was not uniformly present. Most of the organizations identified did not have sustainability as a core value of their organization with exceptions of

Communities First, Inc. and Flint LISC as a local office of the national LISC, which organizes its work around sustainable community objectives. A single organization with the capacity, funding, and vision to lead on advancing a holistic approach to household sustainability specifically, and community sustainability more broadly, does not currently exist in the study region.

Additionally, the barriers specific to working within an income challenged community must be acknowledged. Hurdles identified, separate from the funding and housing stock barriers previously discussed, included the transient characteristics of renters, the difficulty residents experience when attempting to access programs, and residents' values and alignment with energy efficiency.

Many of the programs that address energy efficiency upgrades and weatherization efforts in the home supported both homeowners and renters. Stakeholders identified that a high level of turnover in rental occupancy reduced efficacy of education efforts. While energy efficient improvements may have been made to a home, subsequent residents in a rental unit may not benefit if they did not experience the education portion of the program that supports ongoing reduction of energy and water consumption. Without landlord intervention in educating new tenants about the maintenance or operation of installed equipment, it may not achieve maximum efficiency.

Access to programs that support household level sustainability is a barrier for income qualified residents. Navigating multiple systems to gain entry into these can be time consuming and burdensome. In situations of distress, the focus is on meeting immediate needs such as avoiding utility shut off and bill reduction, foreclosure prevention, or emergency housing rehabilitation services. These crises supersede and overshadow the potential role that household sustainability can serve in lowering the financial burden on residents to meet household costs.

Finally, education and outreach serve an important role for advancing household level sustainability. Stakeholders indicated that the populations they serve, both in low and moderate income households, may not be aware of the benefits of energy efficiency, water conservation, and sustainable construction. Residents may perceive these practices as being too costly and/or unattainable which can also limit engagement and advancement of household sustainability efforts.

## Opportunities

While challenges abound, stakeholders indicated that opportunities are plentiful. Opportunities to advance household sustainability through multiple channels included education and demonstration projects, finding new avenues for green development, creative leveraging of existing programs and funding, and coordinating around existing efforts to advancing a vision for a sustainable community. One theme cited by many stakeholders was that opportunities have been made explicit through

adoption of the City of Flint Master Plan in 2013, which is the first comprehensive master plan for the municipality in over fifty years.

The City of Flint Imagine Flint Master Plan led to creation of Beyond Blight, a City of Flint Comprehensive Blight Elimination Framework released in early 2014 (Pruett, 2014). Beyond Blight recognizes the challenges of a city where one-third of all properties are vacant, demolition costs over the next five year are expected to exceed \$75 million dollars, and blight removal costs are \$7 million annually. Together, the Master Plan and Blight Elimination Framework outline a path forward for the City of Flint that has been embraced by the community. Clear strategies, even with recognition of the challenges and financial shortfalls to realizing the vision, have provided an opportunity for expanded collaboration and focused effort. Many stakeholders identified specific strategies within the plans and cited how their organizations and collective efforts were being organized to advance the vision laid out for the City of Flint. Specific to the study area, stakeholders identified the new land use designations of Green Neighborhood, Green Innovation and Community Open Space and Recreation land use classes as areas where, once new zoning is adopted, will provide opportunities to realize a wide array of sustainability efforts including sustainable construction, renewable energy generation, and green infrastructure implementation.

Population loss affects levels of federal funding available for redevelopment and housing efforts. Additionally, the need for more affordable, multifamily housing will present a shift from previous efforts that focused heavily on single family residential development. The shift away from single family to multifamily development requires a shift in the building techniques and systems, but offers an opportunity to address residential household sustainability in a different framework. Growth and redevelopment of multifamily housing could present additional opportunities for green development efforts.

Finding ways to leverage available resources and funding was an opportunity identified by many stakeholders. Participants that received federal funding in the past clearly recognize a decline in the availability of those funds. This has created the need to leverage public and private funding both within organizations and in partnership with other entities. Many stakeholders seeking to advance their work noted that they were actively seeking new ways to creatively leverage funding. Shifts in funding that support community resiliency and climate change adaptation efforts provide another opportunity to realize gains on household sustainability in the future.

Most often cited by stakeholders were opportunities for education. Education was identified as both an opportunity and a barrier, but multiple avenues for advancing organization level and community education efforts were identified. At the organization level, both government and businesses were



identified as important potential drivers of energy efficiency, water conservation, and renewable energy adoption. Investments in redevelopment in the City of Flint and new construction, particularly in the out-county areas, were identified as opportunities lost. Many of these efforts do not feature sustainable construction or energy and water conservation measures, or if they do, fail to adequately promote the adoption of those technologies. Stakeholders noted that visible and publicized adoption of sustainable construction and renewable energy technology in redevelopment and new development could serve as a public education opportunity and would support shifting perceptions of those working within the buildings and organizations that promote sustainable practices in building, energy efficiency, and water conservation.

At an individual level, education was cited as an essential component and opportunity for advancing household level sustainability. Often noted was that promotion and adoption of sustainability practices at the household level would require more than just a public education campaign. Working directly with residents through existing community and neighborhood engagement efforts was an opportunity to increase understanding and build support for household sustainability. Crafting messages that resonated with residents, working with trusted individuals and community leaders, and providing programs and opportunities that recognized and reduced barriers were identified as important components of education efforts in this area.

Finally, stakeholders stated that they were involved in a number of collaborative efforts that could support efforts moving forward. The majority of stakeholders were both actively working on collaborative efforts and identified partnership opportunities that could be realized in the future. The existing connections between organizations were explored more fully through the social network analysis.

## Social Network Analysis Results

A social network analysis was performed to better understand the connections between organization within the bounded study area of the Flint/Genesee County regions and their ties as related to energy efficiency, water conservation, and sustainable development practices. The social network analysis was informed by stakeholder completion of the actor-linkage survey that aimed to identify connections between organizations providing programs. The survey instrument design featured a list-response (pre-defined organizations) with the option for open-ended (recall based) responses where stakeholder could identify new organizations that were not previously listed. The survey also asked the respondent to characterize their partnerships with other organizations as supporting program development, program delivery, promotion, or other and if the partnership supported water conservation, energy efficiency, sustainable construction, residential support (clarified to include education initiatives), and regular or sustainable construction projects. Respondents could also clarify their responses in the notes section. Of the nineteen participating stakeholders, fifteen provided a completed actor-linkage survey while two completed the survey verbally during phone interview for a total of seventeen (n=17) surveys used to inform the social network analysis

The actor-linkage surveys completed identified 187 total connections between organizations. The number of connections identified by a single organization ranged from a minimum of two to a maximum of twenty-one connections with other organization with a median of ten. The partnerships type was also classified in the following manner:

- ∴ Type A: Organizations that indicated the primary connection was through promotion of programs or services.
- ∴ Type B: Primary connections between organizations were identified as working in a collaborative capacity to inform program development, develop strategies, or share resources. Organizations that may have jointly participated in development of programs or grant proposals that were not funded/unrealized were also placed in this category.
- ∴ Type C: Primary connections between organizations that resulted in joint program delivery wherein the partners participated in offering programs or services, contributed to service offerings or events, or resulted in realized collaborative. It should be noted that program delivery was also indicated as provision as a primary resource (i.e. office space, etc.) that was imperative to the operation of the organization or program, but may not have resulted in direct coordination with the program were also indicated by respondents in this category.

The majority of partnership types were Type C with accounted for 61.5% (115) of all of the connections identified. Type B partnerships accounted for 30.5% (57) of all the connections identified, while Type A (promotion only) accounted for 8% (15) of the connections. This reinforces the notion that organizations in the study region can and do collaborate.

The partnership relationships identified between organizations were utilized to form an actor linkage matrix. The matrix was imported into NetMiner 10 to facilitate the analysis of the stakeholder network analysis and to map the interactions or ties between organizations. These ties between organizations were utilized to analyze measures of centrality of the social network including: in- and out-degree, in- and out- closeness, and betweenness. A primary limitation of the social network analysis is that measures are determined only by the organizations that provided information through the actor-linkage survey. While forty-eight organizations are represented in the social network generated, those connections are only informed by the seventeen organizations that provided information. This results in those seventeen organizations having more prominence within the network and negates the ability to generate measures of out-degree centrality, out-degree closeness centrality, and betweenness centrality for the remaining thirty-one organizations identified. Additional limitations and potential errors are discussed at the end of this section.

### Measures of Centrality

All measures of centrality calculated appear in Table 4. Organizations that contributed to the development matrices are highlighted within this table. In a comparison of the centrality measures, a few trends emerge. Genesee County Land Bank displays high measures of all centrality measures, consistently ranking in the top two spots across in both in- and out-degree, closeness, and betweenness. City of Flint's Department of Planning and Development, Genesee County Habitat for Humanity, and UM-Flint were found in the top ten organizations across all measures as well. This suggests that these organizations actively partner with other organizations to advance household sustainability and can serve in important roles in connecting stakeholders. The Genesee County Community Action Resource Department (GCCARD) also ranked in the top ten organizations in three of the four centrality measures, ranking only slightly lower (12 out of 17) with out-degree centrality. As out-degree centrality in this study serves as a measure of how often an organization indicates that they partner with other organizations in the network on household sustainability programs, this could suggest that GCCARD does not partner as actively as some of the other stakeholders. However, GCCARD did provide a large list of organizations it works with across programs which suggests that this measure may only be indicative of their perception of their work related to weatherization.

Measures of centrality tend to be positively correlated. Deviations from the correlation serve as help explain interactions within the network. In the following sections, the role of the dominant organizations and the deviations from the positive correlations found between the centrality measures are explored. Looking beyond the top four organizations identified across the measures, the focus is on the top fourteen organizations in each measure.

*Table 4. All Centrality Measures of Actors: In-Degree, Out-Degree, In-closeness, Out-Closeness & Betweenness*

| Primary Org Alignment   | Organization   | In-Degree | Out-Degree | In-Closeness | Out-Closeness | Betweenness |
|-------------------------|--|-----------|------------|--------------|---------------|-------------|
| Community Economic Dvlp | City of Flint: Department of Planning and Development        | 0.170213  | 0.276596   | 0.227738     | 0.51087       | 0.046987    |
| Education & Outreach    | CLEARResults   | 0.106383  | 0          | 0.202753     | 0             | 0           |
| Community Economic Dvlp | Communities First, Inc.                                      | 0.12766   | 0.212766   | 0.219605     | 0.423423      | 0.02905     |
| Education & Outreach    | Consumers Energy   | 0.212766  | 0          | 0.265139     | 0             | 0           |
| Community Economic Dvlp | Court Street Village Nonprofit Housing Corporation           | 0.021277  | 0          | 0.107713     | 0             | 0           |
| Education & Outreach    | EcoWorks   | 0.06383   | 0.148936   | 0.175684     | 0.38843       | 0.0087      |
| Education & Outreach    | Edible Flint   | 0.106383  | 0.319149   | 0.198353     | 0.5           | 0.020918    |
| Collaboration           | Flint Area Reinvestment Office (FARO)                        | 0.06383   | 0          | 0.136643     | 0             | 0           |
| Education & Outreach    | Flint Community School District                              | 0.170213  | 0          | 0.247769     | 0             | 0           |
| Community Economic Dvlp | Flint LISC   | 0.021277  | 0.170213   | 0.133673     | 0.447619      | 0.017738    |
| Community Economic Dvlp | Flint Neighborhood Improvement & Preservation Project (NIPP) | 0.148936  | 0.234043   | 0.219605     | 0.479592      | 0.009807    |
| Education & Outreach    | Flint River Farm   | 0.085106  | 0          | 0.191489     | 0             | 0           |
| Community Economic Dvlp | Flint River Watershed Coalition                              | 0.106383  | 0.148936   | 0.212032     | 0.367188      | 0.027166    |
| Education & Outreach    | Flint SOUP   | 0.042553  | 0.12766    | 0.149974     | 0.379032      | 0.001319    |
| Education & Outreach    | Flint/Genesee Jobs Corps                                     | 0.021277  | 0          | 0.143617     | 0             | 0           |
| Education & Outreach    | Flintopia  | 0.06383   | 0          | 0.186314     | 0             | 0           |
| Health                  | Food Bank of Eastern Michigan                                | 0.021277  | 0          | 0.130068     | 0             | 0           |
| Education & Outreach    | Genesee Career Institute                                     | 0.042553  | 0          | 0.174565     | 0             | 0           |
| Education & Outreach    | Genesee Conservation District                                | 0.12766   | 0          | 0.215426     | 0             | 0           |
| Community Economic Dvlp | Genesee County Community Action Resource Department (GCCARD) | 0.170213  | 0.170213   | 0.236498     | 0.447619      | 0.028267    |
| Education & Outreach    | Genesee County Drain Commission                              | 0.021277  | 0          | 0.146673     | 0             | 0           |
| Community Economic Dvlp | Genesee County Habitat for Humanity                          | 0.12766   | 0.319149   | 0.204965     | 0.5           | 0.047619    |
| Health                  | Genesee County Health Department                             | 0.042553  | 0          | 0.164134     | 0             | 0           |
| Community Economic Dvlp | Genesee County Land Bank                                     | 0.212766  | 0.425532   | 0.256206     | 0.594937      | 0.075616    |
| Community Economic Dvlp | Genesee County Metropolitan Planning Commission (GCMPC)      | 0.06383   | 0          | 0.17234      | 0             | 0           |
| Collaboration           | Genesee Regional Chamber of Commerce                         | 0.021277  | 0          | 0.149861     | 0             | 0           |
| Collaboration           | Green and Healthy Homes Initiative                           | 0.085106  | 0.425532   | 0.180851     | 0.580247      | 0.061971    |
| Education & Outreach    | Kettering University   | 0.085106  | 0.170213   | 0.175684     | 0.431193      | 0.012898    |
| Education & Outreach    | Kings Karate Ka - Harvesting Earth Educational Farm          | 0.085106  | 0.276596   | 0.175684     | 0.456311      | 0.026808    |
| Education & Outreach    | MCD Flint Youth Build  | 0.06383   | 0.191489   | 0.166187     | 0.47          | 0.012335    |
| Community Economic Dvlp | Metro Community Development (MCD)                            | 0.170213  | 0          | 0.237711     | 0             | 0           |
| F/S Government          | Michigan Department of Environmental Quality (MDEQ)          | 0.042553  | 0          | 0.17234      | 0             | 0           |
| F/S Government          | Michigan Department of Natural Resources (MDNR)              | 0.021277  | 0          | 0.146673     | 0             | 0           |
| Community Economic Dvlp | Michigan Economic Developers Association (MEDA)              | 0.021277  | 0          | 0.130068     | 0             | 0           |
| F/S Government          | Michigan State Housing and Development Authority (MSHDA)     | 0.085106  | 0          | 0.181411     | 0             | 0           |
| Education & Outreach    | Michigan State University Extension (MSU Ext.)               | 0.085106  | 0          | 0.191489     | 0             | 0           |
| Education & Outreach    | MidMichigan Solar  | 0.106383  | 0          | 0.208897     | 0             | 0           |
| Education & Outreach    | Mott Community College's Technology Division                 | 0.12766   | 0.042553   | 0.215426     | 0.042553      | 0.004248    |
| Health                  | Ohio Ecological Food and Farm Association (OEFFA)            | 0.021277  | 0          | 0.130068     | 0             | 0           |
| Collaboration           | Priority Children  | 0.021277  | 0          | 0.100802     | 0             | 0           |
| Education & Outreach    | Republic Waste Services                                      | 0.021277  | 0          | 0.149861     | 0             | 0           |
| Education & Outreach    | Resource Genesee   | 0.12766   | 0          | 0.19696      | 0             | 0           |
| Community Economic Dvlp | Salem Housing CDC  | 0.191489  | 0          | 0.246201     | 0             | 0           |
| F/S Government          | U.S. Department of Housing and Urban Development (US HUD)    | 0.021277  | 0          | 0.107713     | 0             | 0           |
| F/S Government          | U.S. Department of Labor                                     | 0.021277  | 0          | 0.125338     | 0             | 0           |
| F/S Government          | U.S. Environmental Protection Agency (US EPA)                | 0.021277  | 0          | 0.146673     | 0             | 0           |
| F/S Government          | U.S. Natural Resources Conservation Services (US NRCS)       | 0.021277  | 0          | 0.130068     | 0             | 0           |
| Education & Outreach    | UM-Flint (Engineering & ERS)                                 | 0.170213  | 0.255319   | 0.219605     | 0.505376      | 0.041017    |

## Degree Centrality

In-degree centrality serves to identify *prominent* organizations as many actors recognize a direct tie to them. Entities with a community economic development alignment measured highly in this area which supports the idea that government and CDCs that support housing programs are recognized as serving in a central role with past and current household sustainability initiatives in the region. Consumers Energy tied with the Land Bank in having the highest measure in both in-degree centrality which suggests that organizations actively seek alignment with the utility on household sustainability measures. Beyond the utility, organizations aligned with education and outreach demonstrated more prominence in this area. Flint Community School District was recognized here as an entity that many organizations direct effort and programs toward, which is why they ranked fifth in this category.

Table 5: Top Ten Organizations: In-Degree Centrality

| Primary Org Alignment   | Organization   | In-Degree | Out-Degree | In-Closeness | Out-Closeness | Betweenness |
|-------------------------|--|-----------|------------|--------------|---------------|-------------|
| Education & Outreach    | Consumers Energy   | 0.212766  | 0          | 0.265139     | 0             | 0           |
| Community Economic Dvlp | Genesee County Land Bank                                     | 0.212766  | 0.425532   | 0.256206     | 0.594937      | 0.075616    |
| Community Economic Dvlp | Salem Housing CDC  | 0.191489  | 0          | 0.246201     | 0             | 0           |
| Community Economic Dvlp | City of Flint: Department of Planning and Development        | 0.170213  | 0.276596   | 0.227738     | 0.51087       | 0.046987    |
| Education & Outreach    | Flint Community School District                              | 0.170213  | 0          | 0.247769     | 0             | 0           |
| Community Economic Dvlp | Genesee County Community Action Resource Department (GCCARD) | 0.170213  | 0.170213   | 0.236498     | 0.447619      | 0.028267    |
| Community Economic Dvlp | Metro Community Development (MCD)                            | 0.170213  | 0          | 0.237711     | 0             | 0           |
| Education & Outreach    | UM-Flint (Engineering & ERS)                                 | 0.170213  | 0.255319   | 0.219605     | 0.505376      | 0.041017    |
| Community Economic Dvlp | Flint Neighborhood Improvement & Preservation Project (NIPP) | 0.148936  | 0.234043   | 0.219605     | 0.479592      | 0.009807    |
| Community Economic Dvlp | Communities First, Inc.                                      | 0.12766   | 0.212766   | 0.219605     | 0.423423      | 0.02905     |
| Education & Outreach    | Genesee Conservation District                                | 0.12766   | 0          | 0.215426     | 0             | 0           |
| Community Economic Dvlp | Genesee County Habitat for Humanity                          | 0.12766   | 0.319149   | 0.204965     | 0.5           | 0.047619    |
| Education & Outreach    | Mott Community College's Technology Division                 | 0.12766   | 0.042553   | 0.215426     | 0.042553      | 0.004248    |
| Education & Outreach    | Resource Genesee   | 0.12766   | 0          | 0.19696      | 0             | 0           |

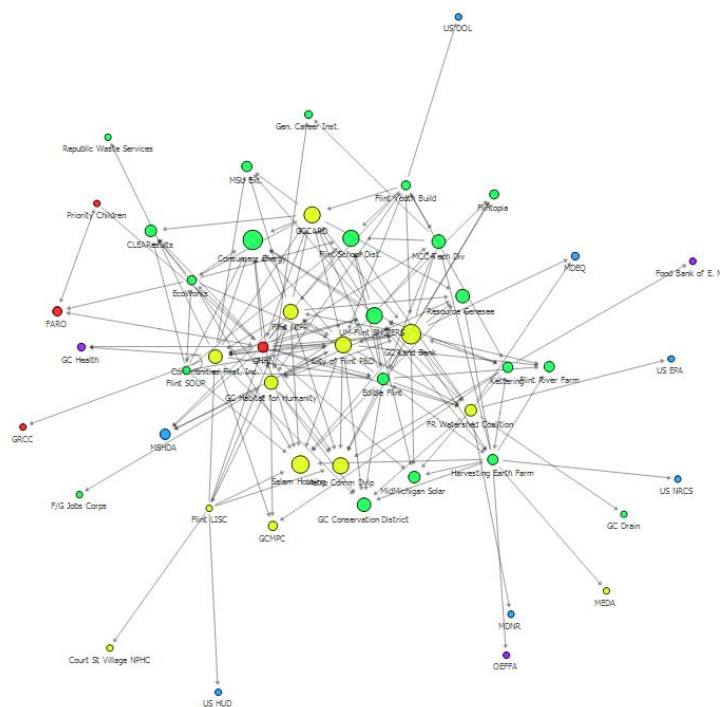


Figure 3. Degree Centrality of All Actors

## Closeness Centrality

Consumers Energy surpassed the Land Bank with the highest measure for in-degree closeness which indicates that other organizations tend to work directly with the utility and the contractors and foundation related to the utility, rather than through indirect ties. The presence of MidMichigan Solar, a now-dissolved renewable energy installation business, suggests that access to private sector businesses that provide household sustainability services played an important role in advancing projects in the past. As no additional organization was identified in the private sector that filled this role, identification of other service providers may be needed to support efforts going forward.

Table 6. Top Ten Organizations: In-degree Closeness

| Primary Org Alignment   | Organization   | In-Degree | Out-Degree | In-Closeness    | Out-Closeness | Betweenness |
|-------------------------|--|-----------|------------|-----------------|---------------|-------------|
| Education & Outreach    | Consumers Energy   | 0.212766  | 0          | <b>0.265139</b> | 0             | 0           |
| Community Economic Dvlp | Genesee County Land Bank                                     | 0.212766  | 0.425532   | <b>0.256206</b> | 0.594937      | 0.075616    |
| Education & Outreach    | Flint Community School District                              | 0.170213  | 0          | <b>0.247769</b> | 0             | 0           |
| Community Economic Dvlp | Salem Housing CDC  | 0.191489  | 0          | <b>0.246201</b> | 0             | 0           |
| Community Economic Dvlp | Metro Community Development (MCD)                            | 0.170213  | 0          | <b>0.237711</b> | 0             | 0           |
| Community Economic Dvlp | Genesee County Community Action Resource Department (GCCARD) | 0.170213  | 0.170213   | <b>0.236498</b> | 0.447619      | 0.028267    |
| Community Economic Dvlp | City of Flint: Department of Planning and Development        | 0.170213  | 0.276596   | <b>0.227738</b> | 0.51087       | 0.046987    |
| Community Economic Dvlp | Communities First, Inc.                                      | 0.12766   | 0.212766   | <b>0.219605</b> | 0.423423      | 0.02905     |
| Community Economic Dvlp | Flint Neighborhood Improvement & Preservation Project (NIPP) | 0.148936  | 0.234043   | <b>0.219605</b> | 0.479592      | 0.009807    |
| Education & Outreach    | UM-Flint (Engineering & ERS)                                 | 0.170213  | 0.255319   | <b>0.219605</b> | 0.505376      | 0.041017    |
| Education & Outreach    | Genesee Conservation District                                | 0.12766   | 0          | <b>0.215426</b> | 0             | 0           |
| Education & Outreach    | Mott Community College's Technology Division                 | 0.12766   | 0.042553   | <b>0.215426</b> | 0.042553      | 0.004248    |
| Community Economic Dvlp | Flint River Watershed Coalition                              | 0.106383  | 0.148936   | <b>0.212032</b> | 0.367188      | 0.027166    |
| Education & Outreach    | MidMichigan Solar  | 0.106383  | 0          | <b>0.208897</b> | 0             | 0           |

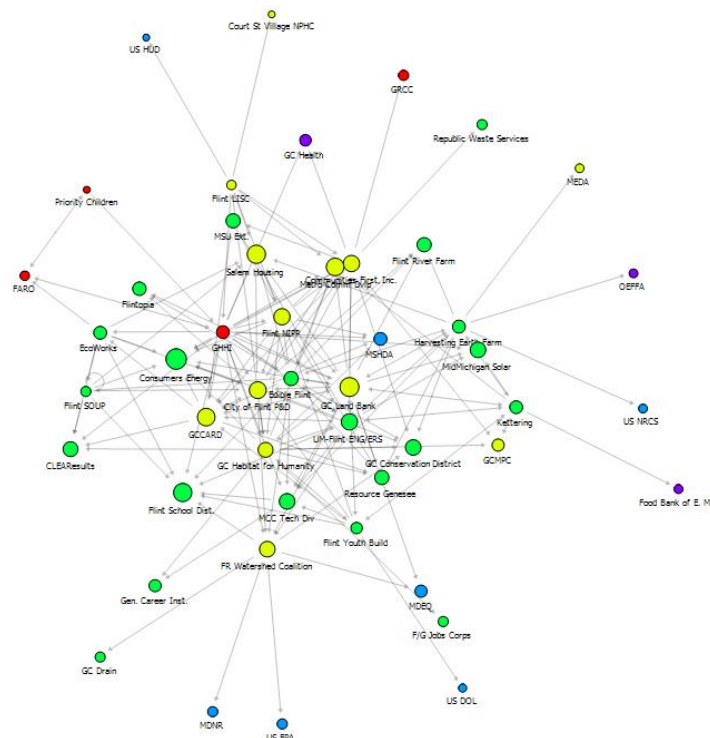


Figure 4. Closeness Centrality of All Actors

## Betweenness Centrality

Organizations focused on community economic development, specifically in the areas of local government and community development corporations (CDCs) also exhibit higher measures of betweenness centrality. This suggests that local government and the CDCs are likely to serve as intermediaries in work focused on the household sustainability. The Green and Healthy Homes Initiative (GHHI) also measured high in betweenness but relatively low in closeness. This suggests that GHHI is embedded in relationships that are clustered separately from the primary organizations working in household sustainability. GHHI's role as a collaborative convener that engages multiple stakeholders including non-traditional partners like the Genesee County Health Department might account for this.

Table 7. Top Ten Organizations: Betweenness Centrality

| Primary Org Alignment   | Organization   | In-Degree | Out-Degree | In-Closeness | Out-Closeness | Betweenness     |
|-------------------------|--|-----------|------------|--------------|---------------|-----------------|
| Community Economic Dvlp | Genesee County Land Bank                                     | 0.212766  | 0.425532   | 0.256206     | 0.594937      | <b>0.075616</b> |
| Collaboration           | Green and Healthy Homes Initiative                           | 0.085106  | 0.425532   | 0.180851     | 0.580247      | <b>0.061971</b> |
| Community Economic Dvlp | Genesee County Habitat for Humanity                          | 0.12766   | 0.319149   | 0.204965     | 0.5           | <b>0.047619</b> |
| Community Economic Dvlp | City of Flint: Department of Planning and Development        | 0.170213  | 0.276596   | 0.227738     | 0.51087       | <b>0.046987</b> |
| Education & Outreach    | UM-Flint (Engineering & ERS)                                 | 0.170213  | 0.255319   | 0.219605     | 0.505376      | <b>0.041017</b> |
| Community Economic Dvlp | Communities First, Inc.                                      | 0.12766   | 0.212766   | 0.219605     | 0.423423      | <b>0.02905</b>  |
| Community Economic Dvlp | Genesee County Community Action Resource Department (GCCARD) | 0.170213  | 0.170213   | 0.236498     | 0.447619      | <b>0.028267</b> |
| Community Economic Dvlp | Flint River Watershed Coalition                              | 0.106383  | 0.148936   | 0.212032     | 0.367188      | <b>0.027166</b> |
| Education & Outreach    | Kings Karate Ka - Harvesting Earth Educational Farm          | 0.085106  | 0.276596   | 0.175684     | 0.456311      | <b>0.026808</b> |
| Education & Outreach    | Edible Flint   | 0.106383  | 0.319149   | 0.198353     | 0.5           | <b>0.020918</b> |
| Community Economic Dvlp | Flint LISC   | 0.021277  | 0.170213   | 0.133673     | 0.447619      | <b>0.017738</b> |
| Education & Outreach    | Kettering University   | 0.085106  | 0.170213   | 0.175684     | 0.431193      | <b>0.012898</b> |
| Education & Outreach    | MCD Flint Youth Build  | 0.06383   | 0.191489   | 0.166187     | 0.47          | <b>0.012335</b> |
| Community Economic Dvlp | Flint Neighborhood Improvement & Preservation Project (NIPP) | 0.148936  | 0.234043   | 0.219605     | 0.479592      | <b>0.009807</b> |
| Education & Outreach    | EcoWorks   | 0.06383   | 0.148936   | 0.175684     | 0.38843       | <b>0.0087</b>   |

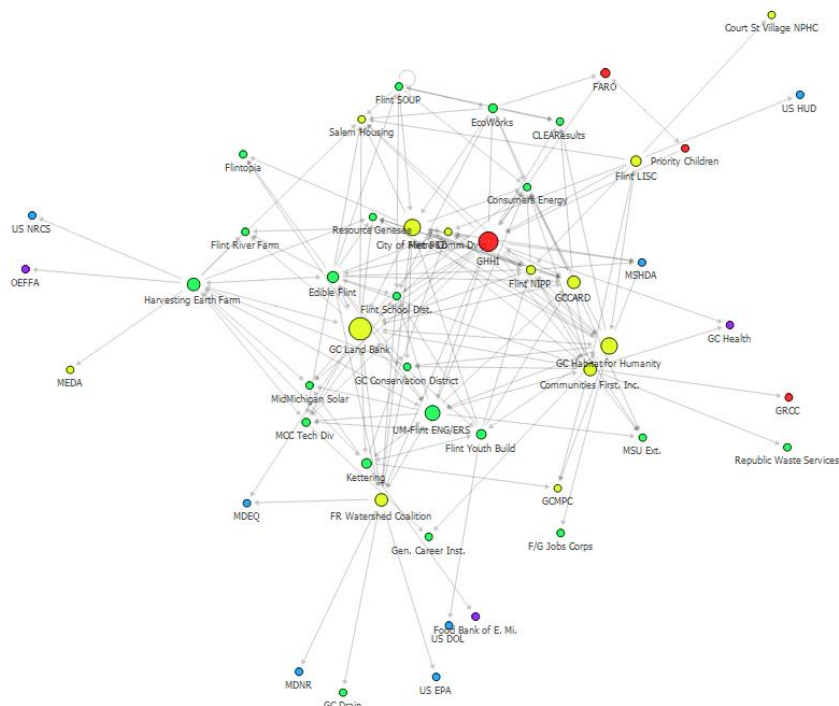


Figure 5. Betweenness Centrality of All Actors

## Social Network Analysis Methodology Limitations and Errors

Fowler, et. al. (2011) suggests a number of misrepresentations and errors in social network analysis that can be introduced when study participants, here acting as organization representatives, are asked to report on their ties. The survey instrument utilized in this study included both list-response (pre-defined organizations) with the option for open-ended (recall based) responses where the organization representative could identify additional organizations not already included in the pre-defined list. Errors introduced could include organization representatives failing to list ties, false reports of ties, or forgetting ties which is more common with open-ended responses.

Additional distortions are evident in that uncorroborated tie responses were recorded. An uncorroborated tie is one where a respondent identifies a tie with another organization and the corresponding actor does not identify a tie or the same strength tie (Fowler, et.al., 2011). Uncorroborated ties are fairly common in social network analysis that focus on inter-organization networks. A single individual asked to report on the interactions of the organization as a whole may be unaware of all the ties of their organization, in particular in larger organizations with multiple departments and focus areas.

The boundary specifications of the study is organizations that addressed energy efficiency, water conservation, and sustainability in construction and residential support (clarified as outreach and education) with residents in the greater Flint and Genesee County area. The interviews made it clear that both the relationship type and focus areas resulted in differing interpretations by organization representatives. Differences in interpretation of the actor-linkage survey questions contributed to issues such as uncorroborated ties. The narrow focus on organizations' alignment with household sustainability may have failed to capture a more holistic view of stakeholders' role within the community as only a portion of their operations or programs in support of sustainability goals.

Finally, as noted previously, a primary limitation of the social network analysis is that measures are determined only by the organizations that provided information through the actor-linkage survey. As only seventeen organizations contributed information through the actor linkage survey to inform social network analysis, the process tends to bias responses toward those participants.



## Discussion & Recommendations

The stakeholder analysis and social network analysis identified thirty-four organizations that are either directly or indirectly aligned with the study focus areas of energy efficiency, water conservation, sustainable construction, and overall household level sustainability in Flint and Genesee County, Michigan. Stakeholders' alignment with the study focus areas manifested through a variety of programs and initiatives. Yet very few organizations had a primary focus in these areas as the specific programs identified were often ancillary to other initiatives of the organizations with a few exceptions. In a broader context, stakeholders were identified as being in alignment with community economic development, community education and engagement, health, and/or coordination and collaboration, yet often had programs that spanned categories.

In addition to identifying organizations providing programs or support that advances household level energy efficiency, water conservation, and sustainable development practices, this study sought to understand if and how the organizations were networked together. The interviews and actor-linkage surveys revealed that stakeholders are active partnering in a variety of ways that span across groups. The social network analysis revealed that there were actors that consistently ranked high in the measures of centrality, and variations in the centrality measures assisted in illustrating stakeholders' position as well as gaps within the network. However, understanding the role and position of the stakeholder within those interactions is important in understanding the interactions between groups.

A comprehensive understanding of how organizations operate and interact within the community as well as within the realm of household level energy efficiency, water conservation, and sustainable development practices is required. This component reveals one of the limitations of this study. One prominent feature of the stakeholder and social network analysis process is that it focused narrowly on organizations' alignment with household sustainability. While some individual organizations incorporate concepts of sustainability into their mission and work in a holistic manner, many only focus a small portion of their operations or programs in support of sustainability goals. Stakeholders' interpretation of the study questions and their responses to the actor-linkage survey in many cases reflected a more narrow interpretation and did not reflect the prominence of their organization within the community as a whole. Additionally, the analysis of the data collected focused on alignments, yet may fail to fully capture the role and limitations of organizations identified herein.

One example that illustrates the need to have comprehensive understanding of organizations role and how limitations of the study may manifest is illustrated in the analysis of one stakeholder, the Genesee County Land Bank Authority (Land Bank). The Land Bank was an often cited partner in household level energy efficiency, water conservation, and sustainable development practices, as a

leader in the community, and ranked in the top two organizations in the social network analysis measures of centrality. Yet the current role of the organization is as an enabling provider of resources in the form of access to land, homes, and other property. Funding constraints make it difficult for the Land Bank to address sustainable construction needs prior to home sale. The Land Bank is not in a position to spearhead green building projects, but they are a willing partner for other community organizations/groups that would like to address that need and can work with partners to identify suitable properties for those types of projects. Leveraging the Land Bank's prominent role within the network to advance household sustainability requires a comprehensive understanding of the organization as well as its limitations to supporting that work.

Other limitations to this study include the focus only at the organization level, the collection of program and institutional information from a single source from the larger organizations, and the limitations inherent to the number of participants in the study. Perceptions related to education and barriers do not reflect resident input, but only the organization's perceptions of residents' needs. Engaging directly with residents to better understand perceptions related to household sustainability is warranted. At the organization level, thirty-four organizations were identified, but only nineteen of those participated in the interviews. Additional engagement with both existing and newly identified stakeholders is also recommended to inform a more comprehensive understanding of roles and opportunities that could support advancing household sustainability moving forward. As discussed in the social network analysis section, stakeholders' completion of the actor-linkage survey lends bias to the results of network analysis toward the seventeen organizations that completed the survey. If a comprehensive understanding of network interactions is desired, a social network analysis study that gathers information from all organizations would be required.

Despite the limitations of this study, clear recommendations emerged that can inform stakeholder engagement moving forward. The following section discusses the prominent themes identified and suggests next steps for stakeholder engagement

### Looking Forward: Working within Existing Efforts

Key efforts related to fair and affordable housing found in community economic development were most prominent in local government entities and community development corporations, primarily funded through federal and state housing and weatherization funds. The majority of programs in this area were focused on income qualified residents identified as low-to-moderate income households, though various issues with the home and/or the resident's financial situation such as credit scores may keep individuals from being able to fully access these opportunities. Stakeholder programs in this area

have been greatly impacted by fluctuations in federal funding over the past six years largely due to the economic downturn and subsequent government spending to address the financial crisis.

The American Recovery and Reinvestment Act of 2009 (ARRA) and other stimulus funding distributed from 2009-2014 did spur growth in programs that supported household sustainability in the study region through weatherization and housing programs. However, subsequent reductions as these funds were retired has impacted stakeholders that received this funding either directly or indirectly, and in many cases, has resulted in a reduction in capacity in those organizations. Also impacting organizations that aligned with community economic development is the local municipality's redistribution of federal funding in a targeted manner to better support coordination and realize impact. In 2015, the City of Flint will distribute single-family home repair and emergency funds to two organizations: GCCARD and Genesee County Habitat for Humanity, both of which recognize and incorporate sustainable construction into their work. Other CDCs are transitioning away from residential construction/redevelopment such as seen with Salem Housing's transition to a community engagement focus as it restructures into a new organization, the Neighborhood Engagement Hub.

The institutional knowledge and capacity within the CDCs suggest that targeted coordination could provide an opportunity to leverage existing efforts in two ways. First, those that are currently actively focused on housing development and rehabilitation work with contractors that are skilled in sustainable development and energy efficiency who could serve as a resource for advancing sustainable construction in other areas. Additionally, coordination of services and leveraging of funding between programs could stretch resources further going forward. Second, community economic development organizations focused on resident education and engagement on housing issues offer an important potential avenue for education and outreach efforts. Programs specific to new homeowners, foreclosure prevention, and home financing could distribute information to residents on how to access household sustainability resources in the area, while home maintenance programs could incorporate more specific training relative to energy efficiency and water conservation.

Working with collaborations that address fair housing serve to bring together partners in community economic development, health, and quality of life. The CDCs participate in groups such as the Community Housing Resource Board, but stakeholders indicated that residential sustainability has not been the primary focus of those interactions. Collaborations such as the Flint Green and Healthy Homes Initiative can be effective in engaging multiple partners, leveraging funds, and improving health outcomes. Working through these existing collaborations and with shared capacity building providers such as Flint LISC may provide an opportunity to craft a shared agenda that takes a broader approach to

advancing green development and household sustainability in support of community economic development objectives.

Educational institutions and career training programs have served as important partners in advancing community level sustainability projects. Continuing to work with these stakeholder to advance projects and programs and to evaluate success remains an opportunity in the future that should be pursued. Stakeholders also identified a need for more contractors certified in sustainable construction. Working specifically with the career training programs to build a workforce that receives and maintains these qualifications is another opportunity. While career training programs are already providing training in sustainable construction to varying extents, working directly with local stakeholders in the housing network to identify the types of credentials they seek would assist in building capacity for sustainable construction and development projects.

### Education and Outreach: Raising Awareness, Changing Attitudes & Increasing Access

The primary provider of community education and outreach related to the household energy efficiency was identified as the electric and natural gas utility provider in the region, Consumers Energy and the subcontractors that work with Consumers Energy. Primary outlets for resident education and program promotion include utility bill inserts, the website, and public service announcements in the utilities service region. The role of a utility in supporting this work made explicit by law (P.A. 295) .This establishes Consumers Energy not only as a program provider but also as a primary funder in this area. Exceptions to this are the federally funded, income-qualified Weatherization Assistance Program offered through GCCARD and the 2014 pilot Youth Energy Squad program led by Detroit Ecoworks, which is currently seeking local partners to continue efforts. Both of these programs have also worked with, or received, financial support from Consumers Energy. Lack of a consistent and sustained community-based education and outreach effort to promote energy efficiency and household sustainability was identified as both a barrier and opportunity to advancing efforts,

Energy efficiency education and programs that are targeted at middle income, as well as low income households based on the demographics and existing programs in the study region, should be pursued. Lawrence Berkley National Lab (LBNL) has produced two reports: Driving Demand for Energy Efficiency (Fuller, et. al., 2010) and Delivering Energy Efficiency to Middle Income Single Family Homes (Zimring, et. al, 2011). Both documents provide recommendations on advancing energy efficiency at the residential level which could help guide efforts in the region moving forward. One key takeaway from these reports is the need for a holistic and sustained approach to market development for energy efficiency that recognizes barriers and crafts effective messages to engage targeted audiences. A

community-based social marketing program identifies specific behaviors to promote and crafts strategies to advance behavior-change. Target audiences are consulted directly to build an understanding of the perceived barriers and benefits to behavior change (McKenzie-Mohr, 2011). Other essential components to a good social marketing strategy would include a testing or pilot of the crafted messages prior to full scale implementation and evaluation. Development of a community-based social marketing strategy informed by residents input could assist in advancing adoption of household energy efficiency and other sustainability practices in the future.

The BetterBuilding for Michigan program serves as another resource for informing future residential energy efficiency programming and outreach efforts. Led by Michigan Saves, the BetterBuildings for Michigan operated from fall 2010 through mid-2013 and was supported by a partnership between the Southeast Regional Energy Office, the Cities of Detroit and Grand Rapids, the Michigan Energy Office, and others including nonprofit, corporate, and foundation partners. During the three years of the program, “11,500 homeowners and more than 80 businesses in Michigan” were impacted by the program (Templeton, et. al., 2013, pg. iv). The focus of the BetterBuildings for Michigan Program was to pilot support programs residents in implementing home energy-saving improvements through home energy assessments. At the completion of the program, a comprehensive guide for groups looking to implement energy efficiency programs for residents was produced. This resource and the studies conducted on the program provide a framework for informing future efforts in Flint. Michigan Saves also serves as an ongoing resource for supporting adoption of energy efficiency measure across a range of consumers (homeowners, multifamily, business, public sector, etc.) by certifying contractors and providing innovative financing for this the work in Michigan (Michigan Saves, n.d).

Beyond residential housing, redevelopment efforts and new construction in both the public and private sectors were identified as an opportunity to shift perceptions related to energy efficiency and clean energy generation. In Downtown Flint, property redevelopment projects such as the Flint Farmers Market and Michigan State University’s move to the old Flint Journal buildings provide highly visible investments in community revitalization. The opportunity exists to have redevelopment efforts such as these also serve as visible demonstration projects and educational opportunities regarding clean energy generation and green development if marketed properly. However, these opportunities have been unrealized to date.

Perceptions regarding the costs of green development and sustainable construction can serve as deterrents to property owners and developers. Alternative financing can assist in overcoming this barrier. Property Assessed Clean Energy (PACE) financing allows property owners to finance energy

improvements on commercial and industrial properties through a special assessment on property taxes (Bleck, 2013). The PACE special assessment can cover up to 100% of the energy efficiency project costs and can be amortized over the useful lifespan of the project, extending for 10 to 20+ years (Levin Energy Partners, 2012). Genesee County is a PACE district, but the City of Flint is not. Exploring PACE financing for the City is one potential financing mechanism to explore that could assist in advancing clean energy and green development projects within the City of Flint in the future. Additional information on PACE financing is provided in Appendix C. Working with businesses who incorporate sustainability provides another potential avenue by raise regional awareness of the importance and value of energy efficiency, water conservation, and sustainable construction.

Community education and outreach as related to water conservation was more evident in nonprofits and local government including municipal water and sewer in site-level strategies. Site level strategies include water catchment on a property and stormwater reduction through natural and installed rain catchment systems like cisterns and rain barrels, rain gardens and bioswales, or other green infrastructure components. The stakeholders also participate in and provide education and outreach related to water resources and water quality. Additional community education efforts that support water conservation were identified in stakeholder organizations working to advance local food systems as water management is a core component of successful gardening and agriculture operations. Organizations working within local food systems also provided strong avenues for engaging in outreach with residents.

## A Vision for Flint

In Flint, the strong alignment with the City of Flint Master Plan, Green Neighborhood and Green Innovation Zones (when adopted), and Comprehensive Blight Elimination Framework provides a vision around which efforts are being coordinated. Integration of sustainable community objectives across all levels of the City's Master Plan offers the opportunity for adoption sustainability practices and build community resiliency in multiple areas. In addition to indicating the need for strategies that support residential adoption of energy efficiency and water conservation measures in new and existing construction, the Master Plan identifies sustainable and renewable infrastructure goals and advocates for creation of a Climate Change Action Plan for Flint. As the City of Flint Master Plan is implemented, the inclusion of sustainable community goals provides a road map to guide efforts.

One immediate opportunity in Flint is to advance water conservation and green infrastructure objectives. Management of vacant lands and the growth of community gardens provide an opportunity to advance water conservation projects at the site-level. However, the trainings and educational

programs that support implementation of water conservation measures have not been offered in a systematic or sustained manner. One recommendation to advance implementation of site-level water conservation is to work with existing stakeholders in natural resource management and local food systems to build and sustain programs for residents and community groups to support installation of water conservation measures and to identify potential ways in which to incorporate household level sustainably into those stakeholders existing education and outreach efforts.

Economic and business development is important both in Flint and across Genesee County. The social network analysis identified that MidMichigan Solar was an instrumental partner in supporting many sustainable construction and clean energy demonstration projects. MidMichigan Solar has since gone out of business, and no additional business partners focused on renewable energy or sustainable construction were identified by stakeholders during the course of the study. This suggests that service providers to fill this market gap will need to be identified to support projects moving forward. Building market demand for energy efficiency, clean energy, and sustainable development services will be an important component in support attracting and retaining service providers to the region.

## Conclusion

This study has identified organizations that both directly and indirectly provide resources to residents that advance energy efficiency, water conservation, sustainable construction, and overall household level sustainability in Flint and Genesee County, Michigan. A variety of programs and initiatives exist, yet a comprehensive guide that connects residents to these resources does not. The inventory of programs produced through this study serves as a starting point for developing promotional material that could market these resources in a systematic manner.

However, a more holistic approach that builds a shared understanding both for organizations and residents regarding the value of energy efficiency, water conservation, sustainable construction, and overall household level sustainability is needed to assure that any promotion of these resources is capitalized on. Development of a community-based social marketing strategy focused on adoption of these measures is warranted. Residents' perceptions of perceived benefits and barriers should be gathering to inform development of the social marketing strategy.

Organizations in Flint are actively partnering on a number of initiatives in the study area as well as to advance community sustainability in a larger context. Opportunities exist to continue and expand upon these efforts, and coordinators of existing programs should be engaged to reduce duplication and to capitalize on the strengths and capacities of these efforts. Stakeholders are willing to collaborate on efforts, but many organizations are working with limited capacity to fully engage in this work. Considerations in developing future partnerships include structuring collaborations that recognize the strengths and limitations of the partnering organizations, develop roles that align with the missions and direction of partner organizations, and ensuring they are mutually beneficial. Promotion is a challenge for many organizations and does serve as one mechanism by which groups can realize mutual benefit.

Key stakeholder groups to engage in future efforts include those aligned with fair housing, natural resource management/water quality, and local food systems. Continued engagement with the utility provider is also necessary to support these efforts. Government entities are important stakeholders for both provision of resources and in setting a larger vision for community sustainability. Government and economic development entities are key partners in advancing efforts that extend beyond programs focused only at residents to include businesses and other public entities in the conversation. Engaging businesses and public entities in adoption and promotion of sustainability practices provides an opportunity to advance a holistic vision of community sustainability, which was identified as a supportive element to increasing resident awareness and adoption of household level sustainability practices.



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## Appendix A: Study Design including Informed Consent, Interview Script and Questions, and Network Survey Tool

**Consent to Participate in a Research Study**

***Connecting Residents to Resources for Energy Efficiency, Water Conservation, and Sustainable Decision Making in Flint, Michigan; a project of the UM-Flint Urban Alternatives House (UAH)***

You are invited to participate in a research study about that seeks to understand and inventory existing programs serving residents in the greater Flint, Michigan region that advance energy efficiency, water conservation, and household-level sustainability practices. The study will further identify ongoing programs and seeks to understand how organizations interact to offer programming to residents.

If you agree to be part of the research study, you will be asked to participate in a one hour interview regarding your organization and the programs offered and will complete a brief survey to identify if and how your organization partners with other institutions offering similar programs.

***Benefits of the research:*** Completion of an inventory of programs and a stakeholder analysis that identifies connections between organizations and resources supporting sustainable development will provide an opportunity to increase resident understanding of and access to options, cost-savings, and programs. This inventory will help inform UM-Flint Urban Alternatives House (UAH) demonstration project and City of Flint efforts to make information more readily available for residents to advance adoption of sustainable technology at the individual level.

***Risks and discomforts:*** You will not be at physical or psychological risk and should experience no discomfort resulting from the research procedures.

***Compensation:*** No compensation will be provided for your participation in this study.

Participating in this study is completely voluntary. Even if you decide to participate now, you may change your mind and stop at any time. You may choose not to [details: e.g., answer any survey question, continue with the interview] for any reason.

If you have questions about this research study, contact information is provided. The Duke University and University of Michigan Flint Institutional Review Boards have determined that this study is not human subject research and thus, does not require IRB oversight.

I agree to participate in this study.

\_\_\_\_\_  
**Signature**

\_\_\_\_\_  
**Date**

Interviews will be audio recorded and transcribed as needed. Upon completion of the study, audio tapes or files will be archived for seven years and then destroyed.

I agree to be audiotaped as part of the study.

\_\_\_\_\_  
**Signature**

\_\_\_\_\_  
**Date**

Researcher: Leyla Sanker, Community Outreach Coordinator, UM-Flint University Outreach, Duke DEL-MEM Candidate 2015, [lsanker@umflint.edu](mailto:lsanker@umflint.edu), 810-424-5477

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**Connecting Residents to Resources for Energy Efficiency, Water Conservation, and Sustainable Decision Making in Flint, Michigan; a project of the UM-Flint Urban Alternatives House (UAH)**

Interview Script

Introduction

Hello. My name is Leyla Sanker. I am a Community Outreach Coordinator with the University Outreach department at the University of Michigan-Flint and a student in the Duke University Duke Environmental Leadership Masters of Environmental Management (DEL-MEM) program. I am coordinating a research project as a portion of my Duke Masters Project (MP.) This work is also being done on behalf of the University and the Urban Alternatives House (UAH). The UAH is a project of the UM-Flint Earth and Resource Science department. Completed in partnership with the Genesee County Land Bank, the UAH is a rebuild of a 1920's residential property that has achieved LEED Platinum Certification. Working with City of Flint and other community partners, UM-Flint hopes to utilize the UAH as a demonstration project and community resource to promote sustainable residential development in the region.

UM-Flint and the UAH partners aspire to achieve a better understanding of organizations and programs working to advance energy efficiency and water conservation options for area residents. This research project aims to create an inventory of these programs in order to promote these resources as appropriate and to support collaboration amongst organizations to advance resident and community level sustainability. Additionally, the outcomes of this inventory will be shared with the City of Flint Planning and Economic Department in support the 2013 Imagine Flint Neighborhood Strategy goal of coordinating with stakeholders to increase awareness of energy saving and water conservation practices in the home and to support advancement of green technology and sustainability in new construction.

I am conducting the interviews with organizations that coordinate programs and efforts in alignment with the UAH and City of Flint sustainability goals identified here. You have been identified as a key representative of your organization who can provide programmatic information to help inform development of this inventory and stakeholder network analysis. The outcomes of this inventory will be made available to the UM-Flint representatives, UAH partners, the City of Flint, and all participating organizations including your own. Additionally, with your organization's permission and as you deem it appropriate, the information provided here may be utilized to promote your and other participants programs that address energy efficiency, water conservation, and sustainable development for residents and developers in our region.

If you have any questions regarding this interview, the ongoing status of this project, or would like to request additional information, contact information for the study has been provided and additional information regarding the UAH and Imagine Flint Master Plan will be provided as well.

Thank you for agreeing to share your time with me today. May we begin the interview?

**Connecting Residents to Resources for Energy Efficiency, Water Conservation, and Sustainable Decision Making in Flint, Michigan; a project of the UM-Flint Urban Alternatives House (UAH)**

Interview Questions

1. Could you please give me a brief overview of the mission of your organization and your role within it?
2. Does your organization coordinate programs that support residents or businesses in advancing energy efficiency, water conservation, or sustainable residential/green building development practices?
  - a. Please describe these programs and the primary outcomes they hope to achieve.
  - b. What is the geographic area served by the programs?
  - c. What population is served by the programs (i.e. is the program open to all residents or is the program/service only available to individuals/groups that meet specific criteria)?
  - d. How long has your organization been coordinating these program, and is it expected to coordinate them in an ongoing manner or only for a specific time frame?
  - e. Are program participants charged a fee for participation, and if so, how is the cost calculated?
  - f. How many participants are served on an annual basis by the programs?
  - g. Do you partner with any other organizations, groups, or individuals to offer or promote the programs (**utilize Partner matrix, Appendix B**)?
  - h. What are the primary ways in which the programs are promoted / advertised to participants?
  - i. Do the programs have the ability or desire to increase participation?
  - j. What are the primary barriers or opportunities your organization has identified for expanding participation in the programs?
3. What does your organization perceive as the primary barriers and opportunities to advancing energy efficiency, water conservation, or sustainable residential/green building development practices and programs within the City of Flint and surrounding region?
4. Would your organization be interested in collaborating with other groups working to advance similar sustainability goals? If yes, in what ways would partnerships or collaborations be most beneficial for your organizations (i.e. cross promotion, joint program development, other)?



5. Would your organization be comfortable with information and links on your program and organization being promoted through another partners website or promotional material? How would it be best to obtain permission for this?
6. Are there any other organizations that should be included in this inventory of energy efficiency, water conservation, or sustainable residential/green building development?



**Connecting Residents to Resources for Energy Efficiency, Water Conservation, and Sustainable Decision Making in Flint, Michigan; a project of the UM-Flint Urban Alternatives House (UAH)**

Thank you for your participation in the stakeholder inventory to assist in identification of organization and programs working to advance energy efficiency, water conservation, and sustainability in the Flint, Michigan regions. If you have any questions regarding your participation in this study, please feel free to contact me directly. You may also contact:

UM-Flint Co-PI: Jacob Blumner, Interim Director, UM-Flint University Outreach,  
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For more information on the UM-Flint Urban Alternatives House, visit the facebook page at  
<https://www.facebook.com/pages/UM-Flint-Urban-Alternatives-House/120014604698641>

Or read the Fall 2014 article in the Michigan Journal of Sustainability:

More information on the 2013 City of Flint Imagine Flint Master Plan and its Housing and Neighborhood Plan Implementation Matrix which identifies Sustainable Practices to “ensure responsible and sustainable housing development” is available on the City of Flint’s Master Plan website at:

<http://www.imagineflint.com/Documents.aspx>

Organization Name: \_\_\_\_\_ Date: \_\_\_\_\_

| Does your organization or program partner or collaborate with any other organizations, groups, or individuals to offer or promote programs addressing resident level energy efficiency, water conservation and household level sustainable practices? Please check all that apply. | Partnership Types | Program Development | Program Delivery | Promotion | Other | Areas addressed | Water Conservation | Energy Efficiency | Sustainable Construction | Residential Support | Construction | Additional Information or Other, Please Specify: |
|--|-------------------|---------------------|------------------|-----------|-------|-----------------|--------------------|-------------------|--------------------------|---------------------|--------------|--|
| <b>Government</b>  |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| <b>Federal</b>   |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| U.S. Internal Revenue Service  |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
|  |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
|  |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| <b>State</b>   |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| Michigan State Housing & Development Authority   |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
|  |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
|  |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| <b>Local or Regional</b>   |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| City of Flint - Community & Economic Development   |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| GCCARD - Genesee County Community Action Resources   |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| Genesee County Land Bank   |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| Genesee County Metropolitan Planning Commission  |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| Genesee County Health Dept.  |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
|  |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
|  |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| <b>Education</b>   |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| Kettering University   |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| Mott Community College's Technology Division   |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| UM-Flint   |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| Flint Community Schools  |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
|  |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
|  |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| <b>Nonprofit or Community Groups</b>   |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| Communities First  |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| Edible Flint   |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| Flint Neighborhood Preservation & Improvement Project  |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| Flint River Watershed Coalition  |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| Flint SOUP   |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| Flint Youth Build  |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| Harvesting Earth Educational Farm  |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| Metro Community Development  |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| Resource Genesee   |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| Salem Housing  |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| Flint River Farm   |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| Flintopia  |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| Genesee Conservation District  |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| GC Habitat for Humanity  |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| EcoWorks   |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| Flint LISC   |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
|  |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
|  |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| <b>Business</b>  |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| Consumers Energy   |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| DTE  |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| MidMichigan Solar  |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
| ClearResults   |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
|  |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |
|  |                   |                     |                  |           |       |                 |                    |                   |                          |                     |              |  |

## Appendix B: Consumers Energy Programs for Residents and Renewable Energy Programs

## Consumers Energy Residential Programs for Energy Efficiency

| Income Qualified Programs                       | Benefits   | Eligibility  | Website  |
|---|--|--|--|
| CARE (Consumers Affordable Resource for Energy) | Affordable payments with 40% CARE discount on monthly bill, frozen past due balance & possible debt reduction if regular payments are made, energy efficiency tools & access to Helping Neighbors program, assigned an CARE assistant agent  | CE customer with past due balance on account, no theft or fraud on account, income equal or less than 150 Federal Poverty Level guidelines. Currently available through September 2015.                | <a href="http://www.consumersenergy.com/CARE">www.consumersenergy.com/CARE</a> Phone: (877) 448-9433   |
| Helping Neighbors                               | Lower monthly bills and increased comfort through improved energy efficiency. Free installation of high-efficiency measures and educational information includes FREE walkthrough home assessment (1 hour), installation measures <u>could</u> include air sealing, band joist installation, furnace operation/maintenance tune-up, faucet aerators, high efficiency shower head, hot water pipe wrap, programmable thermostat, compact fluorescent light (CFL) bulb installation. | Income specific guidelines and focused in geographic areas   | <a href="http://www.consumershelpingneighbors.com">www.consumershelpingneighbors.com</a> Phone: (877) 448-9433   |
|   |  |  |  |
| Programs: All Customers                         | Benefits   | Eligibility  | Website  |
| Home Energy Analysis Program                    | Lower monthly bills and increased comfort through improved energy efficiency. Walkthrough home energy assessment (1 hour), installation of energy efficiency measures valued at \$50 <u>could</u> include faucet aerators, high efficiency shower head, hot water pipe wrap, programmable thermostat, compact fluorescent light (CFL) bulb installation. Customized summary report with recommendations and rebate information.  | <b>\$25 Fee</b> , select geographic area, limited availability - first come, first served basis, must receive both natural gas and electric service from Consumers Energy with active, current account | <a href="http://www.consumershomeanalysis.com">www.consumershomeanalysis.com</a> Phone: (888) 316-8014 Email: <a href="mailto:ConsumersHEA@icfi.com">ConsumersHEA@icfi.com</a> <a href="#">Schedule &amp; manage appointments online</a> |
| Online Home Energy Analyzer Tool                | Online tool for calculating home energy efficiency.  |  | <a href="https://www.energyguide.com/ha/Welcome.aspx?enc=QM8PXqAuaq0kI6FWB89Ei8MKXNhxa+XJPr/mQhmMYnixrpH">https://www.energyguide.com/ha/Welcome.aspx?enc=QM8PXqAuaq0kI6FWB89Ei8MKXNhxa+XJPr/mQhmMYnixrpH</a>                            |

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| Appliance Recycling         | \$50 rebate and free recycling of WORKING refrigerators (10-30 cft), 2 units per home/calendar year. \$15 rebate and recycling for WORKING room AC or dehumidifier if done with fridge recycling.                      | Consumers residential electric customers, see website for additional requirements/information.   | <a href="https://www.consumersenergy.com/eeprograms/RHome.aspx?id=4117">https://www.consumersenergy.com/eeprograms/RHome.aspx?id=4117</a> ; JACO Environmental (877) 270-3519 |
| Heating and Cooling Rebates | \$10 - \$900 in rebates, vary by type for natural gas furnaces, boilers, AC, heat pumps, EMC blowers, high efficiency and tankless water heaters, thermostats (programmable, Wi-Fi), AC, furnace, and boiler tune ups. | Must be either a Consumers Energy electric or gas customer (dependent by type of feature). Systems must have qualifying minimum efficiency ratings. Must be installed by a qualified contractor. See website for rebate amounts, additional requirement & information.   | <a href="https://www.consumersenergy.com/eeprograms/RHome.aspx?id=4122">https://www.consumersenergy.com/eeprograms/RHome.aspx?id=4122</a>                                     |
| Water Heating Rebates       | \$75 - \$100 in rebates for super high efficiency gas water heaters or tankless water heaters.   | Consumer Energy gas customers. Systems must have qualifying minimum efficiency ratings. Must be installed by a qualified contractor. See website for rebate amounts, additional requirement & information.   | <a href="https://www.consumersenergy.com/eeprograms/RHome.aspx?id=4137">https://www.consumersenergy.com/eeprograms/RHome.aspx?id=4137</a>                                     |
| New Appliance Rebates       | \$10 - \$50 in rebates for Energy Star certified Clothes washers, room air conditioners, dehumidifiers, and thermostats (programmable or Wi-Fi enabled).   | Must be either a Consumers Energy electric or gas customer (dependent by type of appliance). Systems must have qualifying minimum efficiency ratings. Must be installed by a qualified contractor. See website for rebate amounts, additional requirement & information. | <a href="https://www.consumersenergy.com/eeprograms/RHome.aspx?id=4118">https://www.consumersenergy.com/eeprograms/RHome.aspx?id=4118</a>                                     |

|                          |   |  |   |
|--------------------------|---|--|---|
| Home Performance Rebates | Comprehensive home energy assessment with BPI-certified contractor (blower door, infrared tests, duct pressure test, flow hood test) provides a full report and recommendations for energy upgrades including recommended upgrades and financial payback in energy savings for recommended improvements. May allow for eligibility for up to \$3,500 in rebates. Additional rebates for individuals that install multiple recommended measures. | Must be either a Consumers Energy electric or gas customer (dependent by type of appliance). Systems must have qualifying minimum efficiency ratings. Must be installed by a qualified contractor. See website for rebate amounts, additional requirement & information. | <a href="https://www.consumersenergy.com/eeprograms/HHome.aspx?id=4129">https://www.consumersenergy.com/eeprograms/HHome.aspx?id=4129</a>         |
| Insulation and Windows   | Rebates for \$15/eligible window, \$40/eligible glass door, up to \$400 on insulation.  | Must be either a Consumers Energy electric or gas customer (dependent by type of appliance). Systems must have qualifying minimum efficiency ratings. Must be installed by a qualified contractor. See website for rebate amounts, additional requirement & information. |   |
| Lighting                 | Instant rebates at participating retailers on CFL and/or LED bulbs. Limit 12 bulbs per Consumers Energy residential household per year.   | No coupons or rebate forms needed. Visit the website to find participating retailers. Listing of sites that also recycle CFL bulbs is provided.  | <a href="https://www.consumersenergy.com/eeprograms/RLighting.aspx?id=6361">https://www.consumersenergy.com/eeprograms/RLighting.aspx?id=6361</a> |

Information retrieved from Consumers Energy website (Consumers Energy, 2015).

## Consumers Energy: Renewable Energy & Consumer Generation Options

### EARP - Solar

Consumers Energy's Experimental Advanced Renewable Program (EARP) for solar energy. As of Feb. 2014, Consumers Energy had 2.7 MW of solar photovoltaic (solar PV) online with nearly \$3.85 million in payments to 250 participants. EARP existed projects in 45 of 58 Michigan counties with the most participants in Kent (39), Jackson (21), and Ottawa (19) counties. EARP projects run in parallel operation in sync with the electricity distribution grid. Separate customer billing meter and generator meter, all energy produced by the solar system is purchased by Consumers Energy.

Consumers Energy receives the Michigan Renewable Energy Certification (MIRECS). Premium fixed rate over different phases over a 15 year contract (shorter of 15 years or until Aug. 31, 2029 when utility can

no longer attain the renewable surcharge that pays for this program.) Program is part of the Consumers Energy Renewable Energy Plan to reach the 10% renewable energy standard by 2015. Consumers Energy is purchasing the energy, capacity, and RECs produced from EARP systems.

To be eligible for EARP: The participant must be a Consumers Energy electricity customer and have a satisfactory payment history with no more than one late payment over the past 12 months. The renewable energy system must be a solar PV system with panels and invertors. The size of the solar PV is limited from 1 to 20 kW for residential systems. Non-Residential (commercial, industrial, governmental or non-profit) systems are limited to 1 to 150 kW. Annual output of the system cannot exceed the annual usage over a 12 month period across all types of renewable technology on site. The solar system must be comprised of at least 50% Michigan materials OR after 2014, constructed with at least 70% Michigan labor.

Rates paid for EARP customers are determined by the interest in previous phases and a pricing mechanism that calculates application capacity in relation to the phase capacity. The rate will not exceed \$0.26/kWh and will never decrease more than \$0.010/kWh. The Phase 18 rate is \$0.243/kWh

### **Net Metering – Any Renewable Energy**

Net metering is limited to 1% of Consumers Energy peak demand. That is broken into different categories of systems by the amount of kW energy produced by the renewable energy technology utilized. This differs by the type and size of system (Categories 1-3) for any renewable technology system. The energy offsets the customers load and results in reduced energy purchased from Consumers Energy. System consists of a single consumer billing meter that runs bi-directionally. There is no payback to customers for excess electricity generation. Any excess generation is credited toward the customers' future bills. The customers also owns the Renewable Energy Credits (REC) for the system.

The size of the solar PV is limited from 1 to 20 kW for residential systems. Non-Residential systems are limited to 1 to 150 kW. Annual output of the system cannot exceed the annual usage over a 12 month period across all types of renewable technology on site.

Preliminary design work necessary to complete an EARP application

- Solar generator DC nameplate capacity
- Estimated annual production
- Tracking/adjustment technology
- % Michigan workforce labor
- % Michigan equipment
- Generator location

If applicants exceed capacity allocation in any application period, qualifying applicants will be randomly selected. Customers are awarded contracts provisionally with system needing to be online within 12 months, evidence of financing, equipment purchase or lease, or binding commitment to purchase or lease.

For more information:

[www.consumersenergy.com/earp](http://www.consumersenergy.com/earp)



(517) 788-8900

Experimental Advanced Renewable Program (EARP) Public Information Meeting April 8, 2014. Online video. Retrieved from:

<http://mediasite.broad.msu.edu/Mediasite/Play/ba7f5ef9aa814a18886b00d7fc0547a01d>

### **Self-Generation – Any Technology**

Consumers are not limited in the amount of energy they can produce through self-generation and technology are not limited to any amount energy produced. There is no payback for additional overflow of energy produced. REC are owned by customer if it is a renewable energy systems.

The size of the solar PV is limited from 1 to 20 kW for residential systems. Non-Residential (commercial, industrial, governmental or non-profit) systems are limited to 1 to 150 kW. **Annual output of the system cannot exceed the annual usage over a 12 month period across all types of technology on site.**

### **Wholesale Agreements – Any Technology**

Consumers are not limited in the amount of energy they can produce through self-generation, and technology are not limited to renewable energy systems. There is no payback for additional overflow of energy produced. Energy only contract with a variable hourly market-based pricing structure with an administrative fee imposed. REC are owned by customer if it is a renewable energy systems.

The size of the solar PV is limited from 1 to 20 kW for residential systems. Non-Residential (commercial, industrial, governmental or non-profit) systems are limited to 1 to 150 kW. **Annual output of the system cannot exceed the annual usage over a 12 month period across all types of renewable technology on site.**

## Appendix C: Property Assessed Clean Energy (PACE): An Overview

## **Property Assessed Clean Energy (PACE): An Overview**

Michigan's 2010 Property Assessed Clean Energy (PACE) law allows districts to finance energy improvements through a property tax mechanism wherein commercial and industrial property owners take on a special assessment which is paid off through the property tax bill (Bleck, 2013). The PACE special assessment can cover up to 100% of the energy efficiency project costs and can be amortized up the useful lifespan of the project, extending for 10 to 20+ years. Under state law, the savings to investment ratio must be positive to achieve approval, and energy savings on all projects over \$250,000 must be guaranteed by the contractor (Levin Energy Partners, 2012).

Under Michigan's PACE law, government may create PACE districts or counties, cities and townships may work together to form a joint PACE district. Lean & Green Michigan™ provides a no-cost service to all Michigan counties, cities and townships if the municipal entity passes an ordinance to become part of the statewide Lean & Green Michigan™ network which then funds administrative costs for the program into the financing for each deal. Genesee County established a PACE district through Lean & Green Michigan™ though the City of Flint has not (Levin Energy Partners, 2012).

Thirty states and the District of Columbia have PACE enabling legislation, but program participation has expanded over the past five years. Only two states in 2010 to active PACE programs across. Now in 2015, Michigan's is one of thirteen states that have active commercial PACE programs, and five of those states have also developed residential PACE programs: California, Georgia, Florida, Missouri, and New York (PACE Market Dashboard, 2015).

California features the largest number and longest running PACE programs in the country. One example of a residential, commercial and industrial PACE program is the Sonoma County Energy Independence Program (SCEIP). The SCEIP was established by \$60 million authorized from the treasury pool. To date, the funding has been utilized for 61 commercial and 2,020 residential projects that equate to \$67,655,869 in investment in energy efficiency, water efficiency and renewable energy projects. \$9 million has been paid back to the county in early payoffs and is being utilized for new project funding. The County is seeking additional funding sources to sustain the program and is exploring sale of revenue bonds from existing assessment to provide continuous funding.